DOCUMENT RESUME

ED 430 120 CE 078 629

AUTHOR	Brown, Bettina Lankard
TITLE	Distance Education and Web-Based Training. Information Series No. 379.
INSTITUTION	ERIC Clearinghouse on Adult, Career, and Vocational Education, Columbus, OH.
SPONS AGENCY	Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE	1998-00-00
NOTE	101p.
CONTRACT	RR93002001
AVAILABLE FROM	Center on Education and Training for Employment, Publications, 1900 Kenny Road, Columbus, OH 43210-1090 (order no. IN379, $9.75).
PUB TYPE	ERIC Publications (071)
EDRS PRICE	MF01/PC05 Plus Postage.
DESCRIPTORS	*Constructivism (Learning); Corporate Education; Delivery Systems; *Distance Education; Educational Innovation; *Educational Technology; Internet; Telecommunications; *Training; *World Wide Web
IDENTIFIERS	*Intranets

ABSTRACT

This publication presents a compilation of information about technologies used for distance education and web-based training for practitioners in adult, career, and vocational education. It focuses on the use of technology in the following ways: (1) as an instructional tool that expands classroom walls and enables the delivery of specialized training in workplaces; (2) as a facilitator of learning based on constructivist theory, supporting cognitive development and equitable learning environments; and (3) as a strategy for development through interactive communication, critical thinking, and authentic assessment. The last section highlights some ways in which distance technology can be an impetus for educational reform. The publication includes reprints of selected articles that explore the following topics in more depth: the virtual campus, learning styles and electronic information, technology and adult learning, information management, ethical considerations in online learning, and cultural sensitivity toward diverse online learners. The paper contains 71 references. (SK)

Distance Education and Web-Based Training

Information Update

by
Bettina
Lankard
Brown

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CENTER ON EDUCATION AND TRAINING FOR EMPLOYMENT
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Distance Education and Web-based Training

Information Series No. 379

by

Bettina Lankard Brown

ERIC Clearinghouse on Adult, Career, and Vocational Education
Center on Education and Training for Employment
College of Education
The Ohio State University
1900 Kenny Road
Columbus, Ohio 43210-1090

1998

Funding Information

Project Title:	ERIC Clearinghouse on Adult, Career, and Vocational Education
Contract Number:	RR93002001
Act under Which Administered:	41 USC 252 (15) and P.L. 92-318
Source of Contract:	Office of Educational Research and Improvement U.S. Department of Education Washington, DC 20208
Contractor:	Center on Education and Training for Employment The Ohio State University Columbus, Ohio 43210-1090
Interim Executive Director:	W. Michael Sherman
Disclaimer:	This publication was prepared pursuant to a contract with the Office of Educational Research and Improvement, U.S. Department of Education. Contractors undertaking such projects under government sponsorship are encouraged to express freely their judgment in professional and technical matters. Points of view or opinions do not, therefore, necessarily represent official U.S. Department of Education position or policy.
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Foreword

The Educational Resources Information Center Clearinghouse on Adult, Career, and Vocational Education (ERIC/ACVE) is 1 of 16 clearinghouses in a national information system that is funded by the Office of Educational Research and Improvement (OERI), U.S. Department of Education. This paper was developed to fulfill one of the functions of the clearinghouse—interpreting the literature in the ERIC database. This paper should be of interest to adult, career, and vocational educators and trainers.

ERIC/ACVE would like to thank Bettina Lankard Brown for her work in preparing this paper. Ms. Brown, a Program Associate at the Center on Education and Training for Employment, is the career education specialist for ERIC/ACVE. She has more than 25 years of experience in writing and designing curriculum products and instructional materials, including multimedia.

The following people are acknowledged for their critical review of the manuscript prior to publication: Brad Cahoon, Webmaster/ Coordinator of Computing Instruction, Georgia Center for Continuing Education; Kathleen King, Assistant Professor, Graduate School of Education, Fordham University; Christine Olgren, Outreach Program Manager, Continuing and Vocational Education, University of Wisconsin-Madison, and Carol Ventresca, Associate Director, Continuing Education, the Ohio State University.

Susan Imel coordinated publication development, Sandra Kerka edited the manuscript, and Janet Ray served as word processor operator.

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Executive Summary

Communications technologies are changing the time, place, and form of learning and instructional delivery. This publication presents a compilation of information about technologies used for distance education and web-based training for practitioners in adult, career, and vocational education. It focuses on the use of technology as—

- An instructional tool that expands classroom walls and enables the delivery of specialized training in workplaces
- A facilitator of learning based on constructivist theory, supporting cognitive development and equitable learning environments
- A strategy for development through interactive communication, critical thinking, and authentic assessment

The publication includes reprints of selected articles that explore these topics in more depth: the virtual campus, learning styles and electronic information, technology and adult learning, information management, ethical considerations in online learning, and cultural sensitivity toward diverse online learners.

Information on the topics in this paper may be found in the ERIC database using the following descriptors—*Constructivism (Learning), Corporate Education, Delivery Systems, *Distance Education, Educational Innovation, *Educational Technology, Internet, Telecommunications, *Training, *World Wide Web, and the identifier *Intranets. Asterisks indicate terms that are particularly relevant.

Introduction

Communication technology has elevated information transfer and exchange to an increasingly significant role in educational, economic, and social development. Educators are using networked communication to improve the delivery of instruction, the development of knowledge, the exchange of information, and the capacity for lifelong learning. Businesses are streamlining their operations, including their delivery of employee training, by using the Internet, intranets, and the World Wide Web. People are using electronic technologies for social interaction, lifelong learning, and professional development. As a result, distance learning is becoming a key strategy for the delivery of education and training.

This publication presents a compilation of information about communications technologies for distance education and their use in adult, career, and vocational education. It includes overviews of information gleaned from recently published journals and other publications, supplemented by reprints of selected articles. It describes the use of technology as—

- *An instructional tool* for educators and trainers in the provision of distance education, web-based training, and company-specific intranet training
- A *facilitator of learning* in support of constructivist practices, cognitive development, and equity
- A *strategy for development* through collaborative interaction, critical thinking, and authentic assessments.

It offers the reader a rationale for adopting electronic technology for educational efforts and highlights strategies educators can use to improve teaching and learning.

Technology as an Instructional Tool

The emergence of new telecommunication technologies has generated new strategies for education and training. Integrated programs of print materials and audio, video, and text-based exchanges are being enhanced by the Internet and World Wide Web. Learning—once concentrated in a classroom where learners were connected in space, time, and actions—has become more expansive, building upon learner engagement and empowerment rather than learner confinement. The new technologies and teaching/learning paradigms are giving students opportuniries to determine when, where, how, and what they will learn.

"Virtual" or "electronic" classrooms promote learning by offering instruction that can be accessed by students from their various locations, often in their own time, and responded to in ways that are meaningful to them. Through use of communication technology systems, these classrooms can offer the flexibility that *individuals* need to continue their education, *institutions* need to maintain their share of the education market, and *businesses* need to provide cost-effective training to their employees. Strategies for providing virtual (electronically delivered) instruction are illustrated in distance education, web-based training, and company-specific intranet training programs.

Expanding Classroom Walls through Distance Education

Telecommunications technology is expanding the way education is provided within and across national borders. Characterized by its ability to connect students and teachers who are separated by space and time, distance education has opened classroom doors and made possible the delivery of education and training across the globe. The U.S. Department of Education reports that, in 1995, 58 percent of community, junior, and technical colleges were offering distance learning classes, a number that is expected to reach 86 percent in 1998 (Wright 1998). The number of distance learning courses being offered through 4-year institutions is also growing. The Continuing Education Department at the Ohio State University, for example, is currently offering 60-80 courses online (Freeland 1998).

> In its earliest form, distance education meant study by correspondence, or what is now called "snail mail." As new technologies developed, distance instruction was delivered through such media as audiotape, videotape, radio and television broadcasting, and satellite transmission. Microcomputers, the Internet, and the World Wide Web are shaping the current generation of distance learning, and virtual reality, artificial intelligence, and knowledge systems may be next. Some define distance education as the use of print or electronic communications media to deliver instruction when teachers and learners are separated in place and/or time (Eastmond 1995). However, others emphasize distance learning over education, defining it as "getting people—and often video images of people—into the same electronic space so they can help one another learn" (Filipczak 1995, p. 111), or "a system and process that connects learners with distributed resources" (ibid., p. 113). (Kerka 1996, p. 1)

Originally, distance learning courses were directed to students located in rural settings who were geographically separated from campus. With increased numbers of adults and/or part-time learners seeking further education or job skill training, distance learning courses became appealing to learners whose multiple family, work, and other responsibilities or physical circumstances prevented them from attending classes on a school campus. Today, however, there is less distinction between the populations who opt for distance education programs and those who prefer on-campus programs. In fact, many students are choosing to be both on-campus and distance learners. At the State University of New York (SUNY), for example, as many as 80 percent of the registrants for SUNY's online learning program are full-time or part-time students on a SUNY campus (Guernsey 1998). At the University of Manitoba in Canada, 66 percent of the students take distance learning courses concurrently with courses on campus (ibid.).

Today's rapidly changing economy and workplace have created a demand for new and updated worker skills, propelling many adults to pursue education and training as a means of maintaining their employability. However, these members of culturally, economically, and socially diverse populations often experience time and money conflicts with on-campus educational options. Additionally, in some postsecondary programs, enrollment is limited because of insufficient numbers of faculty and classrooms. These and other deterrents to on-campus education are drawing many learners to

courses that they can take at their own pace, time, and in a cost-efficient manner (Wright 1998). Distance learning has evolved as "a legitimate way for students to learn" (ibid., p. 10).

Most distance education is implemented in one of two ways: In one, students gather in one place and are brought together with the teacher in real time through satellite, cable, or other technologies. In the other, students use personal computers connected to a networked environment, which allows them to communicate with each other and engage in "synchronized" or "asynchronized" learning. When instruction and learning are "synchronized," for example, students from different locations connect in real time (same time) to pursue a given set of learning activities. In "asynchronized" classrooms, students connect from different locations, but at times that are convenient to them and in ways that allow them to direct their own action sequences for learning (Edelson 1998). Through their connection across time and space, "teachers and students can share text, graphics, audio, video, and virtual reality experiences" (Weinstein 1997, p. 24).

In weighing all of the benefits of distance learning, a prime appeal continues to be convenience. In asynchronous distance learning programs, for example, students can log onto the computer at any time of the day or night, send e-mail to their instructors and other students, collaborate on problem solutions, discuss their viewpoints with other learners, and read text-based course material communicated by their teacher. Teachers can deliver instructional information, impart learning strategies, provide appropriate resource connections, and give ongoing feedback to students at times and locations convenient to them (Guernsey 1998). Students and teachers alike can also take advantage of courses offered outside their communities or regions. Kirkwood Community College in Cedar Rapids, Iowa, for example, attracts students to its specialty courses in basic agriculture and to its specialized training programs for firefighters and people who handle hazardous materials (Blumenstyk 1998).

Most of the drawbacks to distance learning have to do with faculty and student attitude and acceptance. In the virtual classroom, there is more need for one-on-one interaction, with students entering the classroom "seminar" electronically at any time, making their comments and leaving to await further input and feedback. Teachers must be willing to devote more time to giving feedback to each student so the students can proceed with their learning (Edelson 1998). Although challenging to the instructor and

student who favor the lecture mode, the process of teaching and learning through distance education is consistent with new teaching paradigms that favor learner-centered, contextual, and culturally rich education (Brown 1998a).

The introduction of the Internet and World Wide Web has increased competition for the "student" market. The University of Wisconsin-Extension's Distance Education Clearinghouse, for example, lists numerous institutions offering online instruction <http://www.uwex.edu/disted/home.html> (Kerka 1996). Other examples of Internet education include online degree programs offered by traditional institutions such as Penn State through its "World Campus" and those offered by nontraditional "online" institutions such as Western Governors University and the California Virtual University (Selingo 1998).

Community colleges and other postsecondary institutions that have traditionally led the distance education market are finding themselves in heavy competition with this growing number of nontraditional providers of education. Independent organizations and virtual universities, which exist electronically without buildings, classrooms, or faculty are attracting students to their distance education programs by offering a wide range of courses at reduced rates. Other advantages for schools and students include cost savings for travel and lodging and the reduction or elimination of residence requirements (Pollack 1996). College administrators (especially those in 2-year institutions) are beginning to recognize the need to adopt new distance education technologies or face the risk of losing students (Young 1997).

The Community College Distance Learning Network, composed of community colleges across the country, is one effort designed to retain competitive advantage in the distance learning market. This network has developed a website and is expecting to offer up to 500 courses this year, with some being degree programs. Courses will be delivered on the Internet, through video-based telecommunication, and through classroom instruction that integrates the two. "Colleges in the network have said they will make every effort to accept each other's courses for credit, although they do not guarantee it" (Blumenstyk 1998, p. A16).

Distance learning technologies are intended to support an integrated educational program, not replace face-to-face interaction and instruction. Teaching and learning strategies must be continually updated, relying on technologies to enhance their

effectiveness. Human touch cannot be delivered remotely. "Balancing virtual and real interaction will be one of the key educational challenges as we enter the 21st century" (Weinstein 1997, p. 25).

Some key strategies to guide instructors in their attempts to facilitate learning through the use of distance learning methods are reported by Kerka (1996):

> To help learners make effective use of distance learning methods, skilled facilitation is essential. Rohfeld and Hiemstra (1995) suggest ways to overcome the challenges of the electronic classroom: (1) establish the tone early in the course; (2) to overcome the text-based nature of online discussion and to build group rapport and cohesion, introduce participants to each other, match them with partners, and assign group projects; (3) offer training and guidelines to help learners acquire technical competence and manage discussions; (4) provide a variety of activities, such as debates, polling, reflection, and critique; and (5) use learning contacts to establish goals for participation. (p. 2)

The publications reproduced on the following pages offer additional information about telecommunications and distance education. At a time when information exchange and skill development have become a continuing need for workers in a highly competitive, continually changing global society, educators must be willing and ready to adopt new technologies and make changes in their own teaching strategies to enhance student learning. Distance education is one avenue for restructuring the delivery of vocational education and training to help in-school students make ready transitions from school to work and part-time or adult learners pursue their goals for lifelong learning.

Readings:

Imel, S. *Distance Education. Trends and Issues Alert* (1996)

Van Dusen, G. C. *The Virtual Campus. ERIC Digest* (1997)

TRENDS AND ISSUES ALERTS
by Susan Imel 1996
ERIC Clearinghouse on Adult, Career, and Vocational Education
CELEBRATING 30 YEARS - 1966-1996

Distance Education

> *Online education through computer networking is creating a paradigm shift in education. The old models [one-to-one broadcast via television, radio, newspaper, and lecture] came from 19th Century technology and they're based on transmission models.... New computer networking technology requires and enables a whole new way of teaching and learning. For the first time in human history we can have many-to-many communication across time and space. Never before have we been able to have group interaction that's time and place independent–the framework for a learning society.* (Linda Harasim quoted in "Shaping Cyberspace into Human Space" 1996)

Distance education, the delivery of instruction when teachers and learners are separated in place and/or time, is currently being shaped by microcomputers, the Internet, and the World Wide Web (Kerka 1996). Decreasing costs of communication and the blurring of boundaries between the telephone, the television, and the computer ("The Revolution Begins, At Last" 1995) mean that anyone is potentially a distance learner (Kerka 1996). Distance educators are faced with enormous challenges in responding to the rapid changes in technology and to the growing audience for distance learning. Some of the trends and issues affiliated with distance education in the current environment are highlighted in this publication. The discussion is followed by lists of print and organizational resources on distance education.

The potential of current technologies to change the traditional teaching-learning transaction is a theme appearing in the distance education literature. What Linda Harasim refers to as a "paradigm shift in education" ("Shaping Cyberspace into Human Space" 1996) is recognized by others (e.g., Davison 1996; Filipczak 1995; Kerka 1996; Moore 1995b). Moore (1995b) sketches four possible scenarios to describe how educators might respond to "the new opportunities" offered by changing technologies: the minimal change model in which instructors make no fundamental changes but merely use technology as an instructional aid; the marginal change model in which the pedagogy and organization of education remain unchanged and students are added on to conventionally taught classes (the most common application of distance education in North America); systemic change in which institutions change the fundamental organization of teaching by reorganizing it into a system driven by technology; and a virtual system in which universities and schools are "place-free, with little or no formal organization" (p. 3). Only the last acknowledges the existence of a paradigm shift.

A number of issues are affiliated with the potential to change teaching and learning via distance education. One that is mentioned frequently is the need for staff development (e.g., Davison 1996; Filipczak 1995; Thach and Murphy 1995; Warren 1995). Since distance education is now considered to be more than just connecting people in one classroom to a lecture in another, there is growing realization that traditional teaching techniques will not work in distance education settings (Thach and Murphy 1995). Greater emphasis is being placed on learner centeredness and creating interaction between and among learners and instructors. If distance education instructors do not receive training to facilitate greater student participation and interaction, they may simply use distance education "to imitate existing familiar teaching situations and strategies via a variety of technologies" (Davison 1996, p. 151).

Technology is not the main issue any more, but it is still an issue (Filipczak 1995). For many students, issues of access are very real due to the costs of equipment and the charges for accessing the information highway (Davison 1996). Other issues related to technology include a lack of standards ("Trouble in Paradise" 1996) and cost of state-of-the-art equipment (Filipczak 1995). For the most part, however, distance educators can turn their attention to solving questions related to teaching and learning, questions that may lead to a genuine learning society.

Print Resources

Davis, Mike. "Email Conferencing: Creating and Maintaining a Virtual Community." In *Diversity and Development: Futures in the Education of Adults. Papers from the 26th Annual Standing Conference on University Teaching and Research in the Education of Adults*, edited by M. Zukas. Leeds, England: SCUTREA, School of Continuing Education, University of Leeds, 1996.

Examines some of the foundational thinking about notions of community and interaction and cyberspace and considers the extent to which the process might be considered effective as a form of international community building.

Davison, Trevor. "Distance Learning and Information Technology: Problems and Solutions in Balancing Caring, Access and Success for Students." *Distance Education: An International Journal* 17, no. 1 (1996): 145-157.

Explores the paradoxes and tensions that arise in using information technology to provide a caring environment and in creating the conditions for better access and success for adult learners studying at a distance.

"The Death of Distance." *The Economist* 336, no. 7934 (September 30, 1995): S1-S28.

This special section of the *Economist* describes what communication will be like when distance is no object. Although education is not mentioned, the discussions of how telecommunications technology will change have implications for the delivery of distance education.

Filipczak, Bob. "Putting the Learning into Distance Education." *Training* 32, no. 10 (October 1995): 111-118.

Describes the shift in focus from technology to learning, when implementing distance learning. Includes information from distance educators in business, government, and higher education.

Jacques, Michele M. "How to Find World Wide Web Distance Education Resources." *Distance Education Clearinghouse, University of Wisconsin-Extension*, July 1996. <http://www.uwex.edu/disted/resources.html>

Provides tips for finding distance education resources on the World Wide Web and includes a list of selected distance education resources on the Web.

Kerka, Sandra. *Distance Learning, the Internet, and the World Wide Web. ERIC Digest No. 168.* Columbus: ERIC Clearinghouse on Adult, Career, and Vocational Education, Center on Education and Training for Employment, 1996.

Focuses on some of the newest methods of distance learning (DL) using the Internet and the Web and highlights some of the issues that could profoundly change the delivery of adult, career, and vocational education. Includes sections on DL processes, the social nature of DL, and strategies for DL.

Moore, Michael G. "The 1995 Distance Education Research Symposium: A Research Agenda." *American Journal of Distance Education* 9, no. 2 (1995a): 1-6.

In this editorial, Moore reports the results of discussions during the Third Distance Education Research Symposium-Conference. Questions, issues, and needs are listed for four research areas: course design, instruction, policy and administration, and learners and learning.

Moore, Michael G. "The Death of Distance." *American Journal of Distance Education* 9, no. 3 (1995b): 1-4.

Moore's editorial outlines four possible responses of teachers and educational organizations to the new opportunities offered by changing technologies: the minimal change model, the marginal change model, systemic change, and a virtual system.

Reid, Kim A. "Student Attitudes toward Distance Learning." *AT&T Center for Excellence in Distance Learning*, 1995. <http://www.att.com/cedl/stdtatt.html>

This brief reviews research findings on student attitudes toward distance learning. Findings are grouped into four categories: attitude toward the technology, attitude toward distance education teaching methods, attitude toward students and teacher interaction, and attitude toward being a remote student.

"The Revolution Begins, At Last." *The Economist* 336, no. 7934 (September 30, 1995): 15-16.

Introduction to "The Death of Distance," the issue's special supplement on telecommunications.

Rossman, Mark H., and Rossman, Maxine E. *Facilitating Distance Education. New Directions for Adult and Continuing Education, No. 67.* San Francisco: Jossey-Bass Publishers, Fall 1995.

This edited volume features eight chapters that present a variety of perspectives regarding the impact of distance education on the field of adult and continuing education. It is designed to provide an understanding of how to facilitate distance education.

"Shaping Cyberspace into Human Space." *Update* 6, no. 3 (May 1996). <http://fas.sfu.ca/css/update/vol6/6.3-harasim.main.html>

This article from *Update*, produced by Simon Fraser University's (SFU) Centre for Systems Science, features the ideas of Linda Harasim, an SFU communications professor. Harasim suggests that the new technology requires new learning models that are more collaborative.

Stammen, Ronald M. *Using Multimedia for Distance Learning in Adult, Career, and Vocational Education. IN 362.* Columbus: ERIC Clearinghouse on Adult, Career, and Vocational Education, Center on Education and Training for Employment, The Ohio State University, 1995. (ED 384 828)

Explores how educators are using multimedia for distance learning with telecommunications technology. Examines problems and issues involved, including barriers raised by resistance to technological developments.

Thach, Elizabeth C., and Murphy, Karen L. "Competencies for Distance Education Professionals." *Educational Technology Research and Development* 43, no. 1 (1995): 57-79.

Reports on the results of a study designed to identify the roles and competencies of distance education professionals within the United States and Canada. The top 10 competencies illustrate the dual importance of both communication and technical skills in distance education. Includes lists of outputs and competencies for distance learning roles.

"Trouble in Paradise." *Update* 6, no. 3 (May 1996). <http://fas.sfu.ca/css/update/vol6/6.3-trouble-in-paradise.html>

This brief article lists and describes the following five problems that arise when using telelearning: the trouble with text, no physicality, vulnerability, inform ation overload, and lack of tools and standards.

Warren, Ron. "Professional Development for Distance Educators." *AT&T Center for Excellence in Distance Learning*, 1995. <http://www.att.com/cedl/profdev.html>

Reviews research on professional development for distance educators, stating that the research centers on the classroom instructor's ability to use and teach with technology.

Wulf, Katie. "Training via the Internet: Where Are We?" *Training and Development* 50, no. 5 (May 1996): 50-55.

Reviews training opportunities that are available over the Internet, including delivery methods, and internal training networks. Also lists advantages and disadvantages of using the Internet for training. Two sidebars provide relevant listserv and Internet sites.

Organizational Resources

American Center for the Study of Distance Education, College of Education, The Pennsylvania State University, 110 Rackley Building, University Park, PA 16802-3202; (814) 863-3764; fax: (814) 865-5878. Internet: <http://www.cde.psu.edu/ACSDE/>

Distance Education Clearinghouse, University of Wisconsin, 975 Observatory Drive, Madison, WI 53706-1391; (608) 265-6178. Internet: <http://www.uwex.edu/disted/home.html>

ERIC Clearinghouse on Adult, Career, and Vocational Education, 1900 Kenny Road, Columbus, OH 43210-1090; (614) 292-4353 or (800) 848-4815, ext. 4-7686; fax: (614) 292-1260. Internet: wagner.6@osu.edu; <http://www.osu.edu/units/education/cete/ericacve/index.html>

International Centre for Distance Learning, The Open University, Walton Hall, Milton Keynes, MK7 6AA, United Kingdom; +44-1998-653-537; fax: +44-1908-654-173. Internet: icdl-enquiries@open.ac.uk; <http://acacia.open.ac.uk/>

Developed with funding from the Office of Educational Research and Improvement, U.S. Department of Education, under Contract No. RR93002001. Opinions expressed do not necessarily reflect the position or policies of OERI or the Department. *Trends and Issues Alerts* may be freely reproduced.

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The Virtual Campus
Technology and Reform in Higher Education

Gerald C. Van Dusen

The *virtual campus* is a metaphor for the electronic teaching, learning, and research environment created by the convergence of powerful new information and instructional technologies. Today there is a pressing call for technology to provide expanded higher education opportunities to a very wide spectrum of present and potential clientele.

What are the Implications of Teaching on the Virtual Campus?

A paradigmatic shift, from a professor-centered to a student-centered system of learning, has particular implications for the profession of teaching. One implication is a recommitment to creating an ideal learning environment for students, employing new technologies to address variances from the ideal. A second major implication for faculty is a shift from traditional to new roles and classroom responsibilities. The transition from lecturer to facilitator will not happen overnight and must be accompanied by institutional and professional commitment to incorporate research findings into professional development activities. Beyond merely providing technical training in the latest (and soon obsolete) technology, professional development activities will need to focus on crucial classroom variables that will ultimately determine the level of productive interaction and intellectual engagement apropos to the individual and group. (Barr and Tagg 1995).

How Will Classroom Learning Be Different?

Systemic reform has brought about a number of changes to postsecondary education, none more significant than what students learn and how they learn it. With time and distance effectively removed as constraints, colleges and universities are serving a more heterogeneous clientele with diverse educational backgrounds and needs. As Plater (1994) suggests, "these new century students confront us with the possibility that a postsecondary educational system designed to manage enrollment growth by weeding out unprepared or uncommitted students may no longer be appropriate or economically defensible" (p. 9).

Perhaps the most telling difference between learning in the traditional and virtual modes is the kind and extent of interaction. In the traditional classroom, the potential for learner-instructor and learner-learner is very high, but instructors have largely ignored this mandate for change and continue to employ the lecture mode as the predominant method of instruction. In the virtual classroom, on the other hand, technology supports collaborative learning, heterogeneous groupings, problem-solving and higher order thinking skills--educational processes that a lecture format cannot facilitate.

What Will Be the New Scholarly Agenda for Research?

Today's American higher education establishment is an aggregate of three functions—teaching, service, and research. Critics of American higher education today contend that especially since the Second World War faculty have placed emphasis on the research function to the detriment of teaching and service at a time when our culture demands the preparation of workers for a competitive and volatile economy. Voices from within the academy have proposed a reconceptualization of scholarship, one that expands the practice of present-day research to include integration, application, and teaching (Boyer 1990).

New forms of scholarship may necessitate a new epistemology. The scholarships of integration, application, and teaching entail "action" research that may fall outside the boundaries of prevailing institutional epistemology. College and universities must become learning organizations that foster originality and innovation.

Can Technology Help to Create a Culture of Quality?

Calls from external constituencies for academic institutions to demonstrate greater accountability and systemic improvement have prompted many colleges and universities to adopt the principles of Total Quality Management (TQM). Less a set of specific tools than an underlying philosophy, TQM has been distilled by Chaffee and Sherr (1992) into three simple ideas: defining quality in terms of customer needs, bettering work performance, and improving administration. If TQM is the underlying philosophy, Information Resource Management is the facilitator of broad access to information.

In the academic sphere, TQM faces stiff faculty resistance. Many faculty see TQM as "another management fad from the evil empire of business" (Chaffee and Sherr 1992, p. 93). If academic TQM is to emerge as an agent of organizational reform, it is likely to come about more through faculty initiative than external pressure..

How Can the Governance and Finance Considerations Be Managed?

As large sums of money are contemplated and eventually allocated for educational technology development, college and university boards face a number of daunting tasks (Krebs). First, boards must closely monitor regulatory legislation and actively participate in public policy debate. Distance education providers must stay abreast of federal and state regulations which often adversely affect the inter-state delivery of programs and services. Second, boards must establish a telecommunications policy and a strategic plan for its implementation. Third, boards must shepherd resources by defining genuine instructional needs and identifying appropriate technological solutions to fulfill them.

What Conclusions and Recommendations Can Be Drawn?

Colleges and universities are just now crossing the threshold between modest experimentation with and mainstream adoption of information technologies (El-Khawas 1995; Green 1996). Because of the serious repercussions reform efforts are already having on the academy, a number of conclusions and recommendations are warranted. Following are seven conclusions: (1) a paradigm shift can occur only in institutions committed to comprehensive reform; (2) attempts to change the classroom focus from "the sage on the stage" to collaborative learning are likely to fail without a substantial commitment to professional development; (3) higher education will continue to be market driven, requiring redoubled efforts to define academic productivity; (4) new constituencies appear to be well served by a variety of distance learning venues; (5) the TQM movement has made impressive inroads in higher education administration; however, very little penetration has occurred where it most matters—on the academic side of the institution; (6) even as instructional use of technology rises, institutional support for applications development has been dilatory; and (7) the historic commitment to core values in traditional undergraduate education has wavered; the same vacillation threatens to undermine general education requirements in electronically delivered certificate and degree programs.

In the absence of conclusive data with respect to wise technology choices and successful teaching/learning models, institutions must carefully prepare today for what is anticipated as a widespread integration of information into teaching, learning, and research. Following are seven recommendations for beginning this process of integration: (1) create a venue where key stakeholders can analyze major technology issues and purchases; (2) assert the value of technology-based learning from a variety of research perspectives; (3) establish quality standards for certificate and degree programs; (4) avoid pitting traditionalists against technology enthusiasts; (5) make *collaboration* and *cooperation*, not *reengineering* and *restructuring*, the new institutional buzzwords; (6) retain a strong commitment to adequate library staffing and funding; and (7) prepare for success by creating the necessary support structures.

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25-5

The Virtual Campus: Technology and Reform in Higher Education by Gerald C. Van Dusen.

■

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This publication was partially prepared with funding from the Office of Educational Research and Improvement, U.S. Department of Education, under contract no. RR-93-002008. The opinions expressed here do not necessarily reflect the positions or policies of OERI or the department.

The George Washington University
WASHINGTON DC

Opening Learning Opportunities through Web-based Training

The World Wide Web, with over 250,000 sites, has begun to fuel the training market (Dugan 1998). Corporations, as well as educational institutions, are taking advantage of the new telecommunications technologies to improve the accessibility of employee training while eliminating some of the operational difficulties, e.g., the need to secure appropriate training sites and to staff trainers at those sites, and the need to allocate time for employees to train. Sun Microsystems Computer Company in Mountain View, California—which employs 5,000 distributors and 2,000 direct salespeople—calculated that by relying on classroom training, which accommodates a maximum of 30 trainees per class, the company could take as long as a year to train its workers. However, by offering online training, Sun estimates that training time may be shortened by as much as 75 percent (Kahn 1997). Other companies are coming to this same recognition. International Data Corporation reports that by 2000, training delivered over the Internet is expected to reach 32 percent of the information technology training market (Dugan 1998).

Contributing to the appeal of Web-based training are the various software packages becoming available to help businesses track the focus and utility of their efforts. Docent, Inc. recently announced its new software that "links course results with existing corporate databases, so companies can tie training to the bottom line" (Ouellette 1998, p. 1). For example, by monitoring changes in regional sales before and after the provision of training, a company could gain some insight into the effectiveness of its training.

Vocational educators are also using online training strategies. In a typical online course, students access training through websites. They "communicate online by e-mail with an instructor and up to 10 peers per class through a bulletin board. In addition, the site may be linked to others to bring up support documents from other sources" (Goldberg 1998, p. 2).

Kerka (1996) reports the following strategies for Web-based training (p. 1):

- Electronic mail (delivery of course materials, sending in assignments, getting/giving feedback, using a course listserv, i.e., electronic discussion group)

- Bulletin boards/newsgroups for discussion of special topics
- Downloading of course materials or tutorials
- Interactive tutorials on the Web
- Real-time, interactive conferencing using MOO (Multiuser Object Oriented) systems or Internet Relay Chat
- Informatics, the use of online databases, library catalogs, and gopher and websites to acquire information and pursue research related to study

Examples of the use of these modes include the following: High school students with disabilities in Project DO-IT (Disabilities, Opportunities, Internet working, Technology) connect with the University of Washington (UW) to receive instruction via e-mail, join worldwide discussion groups, and access online resources (Burgstahler 1995). Also at UW, rehabilitation therapists learn about adaptive computer technology through videotapes and an Internet class discussion group (ibid.). The Distance Mentor project pairs workplace experts with school-to-work "apprentices" online; they can also simulate work environments through desktop software with an audio channel connected through the Internet (Dede 1996). At Carnegie-Mellon University, the Virtual Corporation simulates a work setting for business students (ibid.). A career counselor offers group and individual online conferences, a listserv, and a database of resumes and resources for clients (Sherman 1994). CUSeeMe software enables technology teacher education supervisors to observe student teachers using a desktop video-conferencing through the Internet ("Agricultural Education" 1996). (Kerka 1996, p. 2)

One of the benefits of using the Internet for education and training is that it enables the instructor to combine live instruction with self-paced modules, using both synchronous and asynchronous instruction. Other advantages reflective of web-based training are detailed by Hawkins (1997, p. 68):

- Training is available to anyone with no limitations on numbers of students.
- The market for online information systems will be broadened through the training of users.
- Neither student nor trainers incur the costs and time to travel to and from a class.
- There are no difficulties in finding a suitable geographic location.

- Training can be scheduled at any time and for any length of time.
- Students provide all the equipment and networking connections necessary to access the web-based training site.
- The student can be shown actual screens and can perform simulated interactions with the system.
- Web-based training technology allows testing and tracking students' progress and provides the ability to hyperlink to more detailed modules for students needing them.

Some disadvantages of web-based training include the following ("Long Distance Learning" 1998, p. 2):

- Limited bandwidth means slower performance for sound, video, and graphics and long waits to download can affect the learning process.
- Some training programs are too static, which limits the level of interactivity and inhibits learning.

Other disadvantages are cited by Kerka (1996, p. 1):

- Reliance on learner initiative can be a drawback for those who prefer more structure.
- Learner success also depends on technical skills in computer operation and Internet navigation, as well as the ability to cope with technical difficulties.
- Information overload is also an issue; the volume of e-mail messages to read, reflect on, and respond to can be overwhelming.
- The proliferation of databases and websites demands information management skills.
- Access to the Internet is still a problem for some rural areas and people with disabilities.
- Social isolation can be a drawback.
- The lack of nonverbal cues can hinder communication.

Selected publications on the topic of web-based training, websites, and listservs related to adult, career, and vocational education appear on the following pages. Information on using the Internet in vocational classes; the distinguishing features of computer-based training (CBT) and web-based training (WBT); explanations of synchronous and asynchronous communication learning; and lists of websites of interest to adult, vocational, and career educators are presented in these reprinted publications.

Readings:

Wagner, J. O. *The World Wide Web and Vocational Education. ERIC Digest No. 186* (1997)

Imel, S. *Web-based Training. Trends and Issues Alert* (1997)

Wagner, J. O. *Adult, Career and Vocational Education: An Internet Guide. ERIC Digest No. 196* (1998)

DIGEST NO. 186

ERIC Clearinghouse on Adult, Career, and Vocational Education

by Judith O. Wagner

1997

EDO-CE-97-186

The World Wide Web and Vocational Education

As Eric Parks says, 'I'm certain cybertechnology will replace all the other learning technologies that exist today.' (Caudron 1996, p. 35)

The Internet is a network of networks including the World Wide Web (WWW), listservs, newsgroups, and discussion forums along with electronic mail and electronic journals. To help vocational educators make the best use of the web, this *ERIC Digest* updates an earlier digest (Wagner 1995) with suggestions for using the Internet in the vocational classroom and a list of websites of interest to vocational educators. It does not pretend to be an exhaustive list of vocational education resources on the Internet—that list changes daily. As in the earlier digest, much of the information that is included was received as a result of messages sent to several listservs asking how the Internet was being used in vocational education and corporate training. Previously, respondents indicated that they were just getting started and students were spending time surfing the Web, making use of electronic mail, and participating in listservs. The times they are a changin'! Now, in addition to all of the above, students are developing and maintaining websites, using digital cameras to evaluate teachers, delivering training to industry, and using materials found through Web searches.

A survey by Market Data Retrieval determined that approximately one-third of all public schools are online; that the larger the school, the more likely it is to use the Internet; and that the Internet is used mostly for research. If the integration of the Internet into the classroom is to be successful, teachers must be involved and work with it (Leiken 1996). The examples here show how vocational teachers and trainers are using the Internet.

Examples of Current Use

It has been suggested that increased use of performance support systems, sophisticated computer simulations and multimedia training programs are changing and diminishing the role of the traditional corporate classroom (Wulf 1996). Companies are discovering that they can use the Internet to distribute information, resources, and learning tools to employees worldwide with relatively little end-user support (Caudron 1996).

A high school teacher in Minnesota has developed a website for use in doing career research. Students look for career opportunities on the Web and check the classified ads in the local newspaper, which is also on the Web (M. Savchenko, Internet message, July 3, 1997).

In Australia, the Certificate in Workplace Leadership is offered through the Web. Industry participants work with an Internet module and a textbook. Although text-driven, the tutor is online (M. Greig, Internet message, July 2, 1997).

The University of Idaho has a project designed to assist teacher educators with the evaluation of teachers in the field through the use of digital cameras. The technology allows them to supervise student teachers and demonstrate teaching and classroom management. They also use the Internet for chat groups related to classes, and newsgroups and websites are created for exams and discussion (J. McMurtry, Internet messages, July 1 and August 19, 1997).

In a rural area of Ohio, students use the Internet to search for specific materials related to their programs. They have found automotive specifications and tune-up tips, home design plans and insulation specifications, and cosmetology product and styling ideas (D. Fullerman, Internet message, June 30, 1997).

The National School-to-Work Office's Practical Tool page includes over 200 manuals, curriculum, and guides that were created by local and state STW offices. The materials are useful in starting new school-to-work partnerships (A. Santo, Internet message, June 30, 1997).

An instructor in Canada uses exam questions from the U.S. Coast Guard and an interactive tutorial on learning how to read a micrometer from the U.S. Navy. He also uses a file of a spinning engine to perk up his lectures (G. Bradshaw, Internet message, June 28, 1997).

A Tech Prep/School-to-Work Coordinator in Florida uses the websites of the Occupational Outlook Handbook, O*NET, and TrainingNet in her business education class. She has also used career information websites for classes related to creating resumes, cover letters, and other job search methods (M. Teachout, Internet message, June 28, 1997).

A business and industry education professor from the University of Minnesota has created a variety of websites for various teacher education courses. A team of teachers will be developing new activities and the sites are regularly updated (J. Lambrecht, Internet message, June 28, 1997).

Examples of lesson plans can be found on the website of a vocational high school in Massachusetts. It also includes samples of student work (N. Moran, Internet message, June 29, 1997).

The director of the business education program at Southern Illinois University uses the Internet in a variety of ways: to communicate with students, to review curriculum from other schools, to keep abreast of current issues, to review marketing strategies from other countries, to obtain shareware, to find statistics, and to locate student and professional materials and associations (M. Erthal, letter, August 4, 1997).

Among the advantages of using the Internet are the following (Glener 1996; N. Moran, Internet message, June 29, 1997; Wulf 1996): ease of modifying and distributing curriculum; ease of sharing information and collaborating; reduced costs of printing and mailing manuals and CD-ROMs; multimedia capability; quick development time; variety of capabilities; ease of updating; learner control; opportunity for interaction; and availability of excellent materials and programs. Some barriers to using the Internet include limited bandwidth, lack of sufficient up-to-date equipment, newness of authoring systems, unreliable links, and lack of Internet skills.

Relevant Websites

ERIC Clearinghouse on Adult, Career, and Vocational Education (ERIC/ACVE): http://coe.ohio-state.edu/cete/ericacve/index.htm. ERIC/ACVE provides full text of *ERIC/ACVE Digests*, *Trends and issues Alerts*, *Practice Application Briefs*, and *Myths and Realities*. It also includes general information on the ERIC system and links to all ERIC components and a variety of adult, career, and vocational education websites.

National Center for Research in Vocational Education (NCRVE): http://ncrve.berkeley.edu/. The NCRVE site includes information about NCRVE, full text of many of their publications and newsletters, and links to other vocational education websites.

National Business Education Association: http://www.nbea.org/. NBEA includes standards, publication lists, membership information, conference and meeting information, scholarship information, and links to related sites.

Professional Secretaries International (PSI): http://www.gvi.net/psi/. PSI provides information about the organization, certification, membership, products and services, and full text of some products.

Vocational Education Resources: http://pegasus.cc.ucf.edu/~sorg/vocation.html. This site offers a vast array of links related to all aspects of vocational education including school-to-work/tech prep, research, federal government information, legislation, publications, career and job information, and training.

Skill Standards Network, American Training Standards Institute: http://steps.atsi.edu. The ATSI site provides information on projects, legislation, and standards.

Office of Vocational and Adult Education: http://www.ed.gov/offices/OVAE/. This U.S. Department of Education site includes information on funding, legislation, policy, school-to-work, press releases, and links to relevant sites.

Skillsnet: http://www.skillsnet.org. SkillsNET provides national and international trends, online technologies, publications, project descriptions, a research library, and links to other websites.

South Dakota Department of Education: http://seti.tec.sd.us/sdve/vocedsd.htm. This state site provides a calendar of events, excellent links, and other resources.

O*NET: http://www.doleta.gov/programs/onet/. This Department of Labor site replaces the outdated *Dictionary of Occupational Titles*. It includes information about job characteristics and worker attributes and provides links to other sites.

Florida School-to-Work Information Navigator: http://www.flstw.fsu.edu/. The Florida site includes information on grants and legislation, professional development, resources, a calendar of events, and links to other sites.

School-to-Work National Office: http://www.stw.ed.gov/. This government site includes hot topics, resources and tools, grant information, lists of technical assistance providers and state initiatives, and a calendar of events.

ERIC Review on School-to-Work: http://www.aspensys.com/eric/ter/stw/. Full text of *The ERIC Review* issue on school-to-work is available at this site.

AskERIC Virtual Library and Other Resources: http://www.askeric.org. This is a gateway to the resources of AskERIC including the AskERIC Virtual Library, a Q&A service, links to all ERIC components, and the searchable ERIC database.

National Center for Education Statistics: http://www.ed.gov/NCES/. This U.S. Department of Education site includes frequently asked questions, publications, and information about projects, data, and surveys.

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Caudron, S. "Wake Up to New Learning Technologies." *Training and Development* 50, no. 5 (May 1996): 30-35.

Glener, D. "The Promise of Internet-Based Training." *Training and Development* 50, no. 9 (September 1996): 57-58.

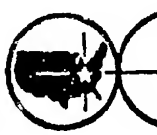
Leiken, E. "The Net: Where It's @." *Techniques: Making Education and Career Connections* 71, no. 8 (November-December 1996): 34-40.

Matyska, R. J., Jr. "Using the Internet to Expand Resources." *Business Education Forum* 50, no. 2 (December 1995): 19-22.

Wagner, J. O. *Using the Internet in Vocational Education. ERIC Digest No. 160.* Columbus: ERIC Clearinghouse on Adult, Career, and Vocational Education, 1995. (ED 385 777)

Wulf, Katie. "Training via the Internet: Where Are We?" *Training and Development* 50, no. 5 (May 1996): 50-55.

Developed with funding from the Office of Educational Research and Improvement, U.S. Department of Education, under Contract No. RR93002001. Opinions expressed do not necessarily reflect the position or policies of OERI or the Department. *Digests* may be freely reproduced.



CENTER ON EDUCATION AND TRAINING FOR EMPLOYMENT
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TRENDS AND ISSUES ALERTS
by Susan Imel 1997
ERIC Clearinghouse on Adult, Career, and Vocational Education

Web-Based Training

> *For centuries the "technology" for transferring skills and knowledge has changed little: one human being teaching another. . . . Now, [the] landscape is awash with a torrent of new technologies, creating almost limitless possibilities for heightened learning.* (Bassi, Cheney, and Van Buren 1997, pp. 46-47).

The World Wide Web (WWW), the technological phenomenon of the late 20th century, is part of this "torrent of new technologies." Although usually thought of first as a vehicle for delivering information, the Web also shows great promise as a medium for "heightening learning." Many institutions and organizations have been using the Web as a way of delivering information to support their education and training efforts, but now some are also beginning to use it as an instructional vehicle to develop skills and knowledge (Filipczak 1996; Hawkins 1997a). The term *web-based training* (WBT) is emerging to distinguish the use of the Web as a training and education tool from other applications, for example, as an information source. Although WBT is still in its infancy, interest in it is growing rapidly (Gantz 1997; Hawkins 1997a). According to Gantz (ibid.), "only about $100 million of the $7 billion that U.S. companies pay for IT [information technology] training and education was spent on Web-based training last year. But that amount will grow more than twentyfold in five years, and companies that have struggled with various training media for years may find that the Web offers a breakthrough" (p. 37). Educational institutions are also increasingly turning to the Web as an instructional tool. This ***Alert*** highlights some trends and issues surrounding WBT and provides a list of resources for further information.

The first set of issues are definitional and revolve around the following questions: What is WBT and how does it differ from traditional computer-based training (CBT)? Kilby (n.d.) defines WBT as computer-based training designed around Web technologies such as Web browsers and HTML that is intended for delivery across networks. Kilby acknowledges that terms such as *internet-based training, internet-based instruction, web-based instruction*, and *web-based learning* are similar to—if not synonymous with—WBT, and suggests that whatever term is used, the most important distinguishing characteristic is the emphasis on instruction and not just on information delivery.

Another way of defining WBT is offered by Fritz (1997), who distinguishes between real-time WBT, non-real-time WBT, and various combinations of the two. In real-time WBT, instructors use the Web to extend the reach of the classroom, whereas "non-real-time WBT is created in a traditional CBT authoring system and is simply downloaded from the Web to the student's hard drive where the student can take the instruction at his or her leisure" (ibid. p. 70). Fritz concludes that "to be effective WBT needs to be like CBT, but better" (ibid.).

The "need to be like CBT, but better" raises a second set of issues surrounding WBT. These issues have to do with what constitutes effective learning environments and how to create them on the Web. Because behaviorist learning theory undergirds much of CBT, critics of this approach do not want to see it replicated in WBT (O'Carroll 1997; Slay 1997).

The idea of using cognitive-based theories of learning as the basis for designing web instruction is emerging in the literature (e.g., O'Carroll 1997; Slay 1997; and Wild and Omari 1996). These theories "view learners as beings who purposefully interact with the environment—learning lies in the active construction of an internal world" (O'Carroll 1977, p. 119)—and include situated cognition, cognitive apprenticeship, constructivism, and the social development of knowledge (Slay 1997).

Although still in its infancy, WBT shows great promise. Based on the trends and issues described here, important questions for trainers and adult educators involved with WBT include the following: does it provide an educational environment that is truly interactive for the learner and is the emphasis on the learner and not the technology?

Resources

Alexander, Shirley. "Teaching and Learning on the World Wide Web." Paper presented at ***AusWeb 95***, Ballina, NSW, Australia, July 1995. <http://www.scu.edu.au/sponsored/ausweb/ausweb95/papers/education2/alexander/>

Examines the failures of previous technologies to transform education and reviews research available to WWW developers about the way people learn and the strategies that promote the type of learning that is valued. Suggests that this knowledge can be used to inform how the WWW is used for instruction.

Bassi, Laurie J.; Cheney, Scott; and Van Buren, Mark. "Training Industry Trends 1997." ***Training and Development*** 51, no. 11 (November 1997): 46-59.

Provides a detailed report of three trends: learning technologies, outsourcing, and performance measurements.

Davies, Clare, and Houghton, David. "The Web—Hyperspace, Hypermedia, or Just Hyped?" Paper presented at the British HCI Group Symposium, ***The Missing Link: Hypermedia Usability Research and the Web***, Knowledge Media Institute, The Open University, May 1, 1996. <http://zaphod.mk.dmu.ac.uk/~cdavies/webpaper.htm>

Examines the assumptions behind viewing the Web as a hypermedia system, using as its basis what is known about Web users' problems and behavior.

Filipczak, Bob. "Training on Intranets: The Hope and the Hype." ***Training*** 33, no. 5 (September 1996): 24-32.

Reviews efforts of organizations to deliver training on their internal computer networks (i.e., intranets) and assesses the strengths and weaknesses of intranets as well as their potential for delivering training in the future.

Fritz, Mark. "Is Web-Based Training New Hype in Old Wineskins? Training Interactions." ***Emedia Professional*** 10, no. 6 (June 1997): 69-71. <http://www.onlineinc.com/emedia/JunEM/training6.html>

Compare web-based training (WBT) to computer-based training (CBT) and provides some questions designed to clarify current misconceptions about WBT.

Gantz, John. "Web-based Training Can Help IT Organizations." *Computer World* 31, no. 9 (July 1997): 37.

Reviews the advantages of web-based training, including projections for its future development and the obstacles to its implementation.

Hawkins, Donald T. "Web-Based Training for Online Retrieval: An Idea Whose Time is Coming." *Online* 21, no. 3 (May/June 1997a): 68-69.

Defines web-based training (WBT), lists its advantages, and reviews some WBT course development issues (e.g., design).

Hawkins, Donald T. "Web-Based Training for Online Retrieval: Some Examples." *Online* 21, no. 5 (September/October 1997b): 73-75.

Describes the efforts of two commercial firms and an academic library in offering web-based training designed to assist individuals retrieve online information more effectively and efficiently.

Hites, Jeanne M., and Ewing, Keith. "Designing and Implementing Instruction on the World Wide Web: A Case Study." Paper presented at the Annual Conference of the International Society for Performance and Instruction, Dallas, TX, April 1996. <http://lrs.stcloud.msus.edu/ispi/proceeding.html>

This case study describes some tips and lessons learned from a project at St. Cloud State University designed to teach information literacy over the WWW. Both the advantages and disadvantages of the Web as an instructional environment and the politics of web-based course development in an academic environment are reviewed.

Huang, Albert H. "Online Training: A New Form of Computer-Based Training." *Journal of Education for Business* 72, no. 7 (September-October 1997): 35-38.

Reviews the development of online training (OLT), training that uses computer networks as the primary channel to conduct training activities, by comparing it to computer-based training. Includes the advantages, challenges for trainers and learners, and types of OLT systems.

Kilby, Tim. *Web-Based Training Information Center*. <http://www.webbasedtraining.com>

The web-based training (WBT) information center contains a number of resources related to WBT, including "Going Online for Training" (http://www.filename.com/online/sld001.htm) a WBT primer: the "WBT Information Center 1996 Training Survey" (http://www.filename.com/wbt/_private/survey_1996.htm) that provides the results of a survey on organizational training capabilities, current implementations, plans, and attitudes related to WBT; "Frequently Asked Questions" (http://www.filename.com/wbt/_private/faq.htm) that provide basic, helpful information about WBT; and "WBT Advantages and Disadvantages" (http://www.filename.com/wbt/_private/advdis.htm).

O'Carroll, Peter. "Learning Materials on the World Wide Web: Text Organization and Theories of Learning." *Australian Journal of Adult and Continuing Education* 37, no. 2 (July 1997): 119-123.

Discusses certain design aspects of WWW instructional documents in the context of a constructivist approach to pedagogy, particularly in relation to the structures employed and the organization of the text.

Oliver, Ron; Herrington, Jan; and Omari, Arshad. "Creating Effective Instructional Materials for the World Wide Web." Paper presented at *AusWeb 96: The Second Australia WorldWideWeb Conference*, Gold Coast, Queensland, Australia, July 1996. <http://www.scu.edu.au/sponsored/ausweb/ausweb96/educn/oliver/>

Considers design aspects that can help to improve the instructional effectiveness of teaching and learning through the WWW. Included are planning and development of the instructional materials, the learners, and how the materials will be implemented.

Schaaf, Dick. "A Pipeline Full of Promises: Distance Training Is Ready to Deliver." *Training* 34, no. 10 (October 1997): A6-A24.

This special section on distance training is a primer that introduces readers to a host of websites, reviews the advantages of distance training, lists lessons learned regarding web-based training, and provides a glossary of distance training terms.

Slay, Jill. "The Use of the Internet in Creating an Effective Learning Environment." Paper presented at *AusWeb 97: The Third Australian World Wide Web Conference*, Gold Coast, Queensland, Australia, July 5-9, 1997. <http://ausweb.scu.edu.au/proceedings/slay/paper.html>

Evaluates the use of the Internet in providing an effective learning environment against criteria contained within the qualities desired for University of South Australia's graduates rather than narrower, behaviorist ones based on Skinner.

Webb, Greg. "A Theoretical Framework for Internet-Based Training at Sydney Institute of Technology." Paper presented at *AusWeb 97: The Third Australian World Wide Web Conference*, Gold Coast, Queensland, Australia, July 5-9, 1997. <http://ausweb.scu.edu.au/proceedings/webb/paper.html>

Examines what it means to use the Internet as a substitute for the classroom without sacrificing all the advantages of face-to-face teaching. The role of educational administration is also included.

Wild, Martyn, and Omari, Arshad. "Developing Educational Content for the Web: Issues & Ideas." Paper presented at *AusWeb 96: The Second Australian World Wide Web Conference*. Gold Coast, Queensland, Australia, July 1996. <http://www.scu.edu.au/sponsored/ausweb/ausweb96/educn/wild/paper.html>

Proposes strategies for designing effective learning environments for the Web that are undergirded by conversation frameworks and constructivist theory.

Wulf, Katie. "Training via the Internet: Where Are We?" *Training and Development* 50, no. 5 (May 1996): 50-55.

Reviews training delivery methods using the Internet (e.g., e-mail, downloading), internal training networks, and assesses the advantages and disadvantages of using the Internet for training. Includes information on web-based training developers, examples of Internet courses, and examples of sponsors of Internet-based training, including URLs.

Websites

WBT Information Center at www.webasedtraining.com

The Masie Center, The Technology and Learning ThinkTank at www.masie.com

World Wide Web Courseware Development Home Page at www.unh.ca/weh/wwwdev/

Developed with funding from the Office of Educational Research and Improvement, U.S. Department of Education, under Contract No. RR93002001. Opinions expressed do not necessarily reflect the position or policies of OERI or the Department.

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DIGEST NO. 196

ERIC Clearinghouse on Adult, Career, and Vocational Education

by Judith O. Wagner

1998

EDO-CE-98-196

Adult, Career, and Vocational Education: An Internet Guide

The Internet includes thousands of websites and listservs related to every imaginable subject.Sifting through them to find the ones that relate to a specific areas of interest can be a time-consuming and often mind-boggling job.This *ERIC Digest* provides an annotated list of websites and listservs related to the broad areas of adult, career, and vocational education. It is not intended to be a complete list, but an introduction to sites in those areas.

ERIC

ACCESS ERIC <http://www.aspensys.com/eric/>, 2277 Research Blvd., 7A, Rockville MD 20850; 800/LET-ERIC (538-3742); acceric @inet.ed.gov. Provides access to all ERIC system-related websites as well as those of the U.S. Department of Education.

AskERIC <http://www.askeric.org/>, ERIC Clearinghouse on Information and Technology, Syracuse University, Center for Science and Technology, 4th Fl., Room 194, Syracuse NY 13244-4100; 800/464-9107; eric@ericir.syr.edu. Offers access to ERIC searching, the AskERIC questioning service, lesson plans, the AskERIC Virtual Library, the Virtual Reference Desk, and the Gateway to Educational Materials (GEM).

Education Resource Organizations Directory <http://www.ed.gov/Programs/ERODmap.html> (see ACCESS ERIC above for contact information). ERO.) offers information on over 2,000 education-related national, state, and regional organizations.

ERIC Clearinghouse on Adult, Career, and Vocational Education <http://ericacve.org/>, 1900 Kenny Rd, Columbus OH 43210-1090; 800/848-4815, ext. 27069; ericacve@postbox.acs.ohio-state.edu. Includes full text of user publications, access to electronic journals, information about submitting materials to ERIC, and links to many websites related to adult, career, vocational education and training.

Oryx Press/CIJE Source Journal Index <http://www.oryxpress.com/cije.htm>, 4041 N. Central Ave. at Indian School Rd., Suite 700, Phoenix AZ 85012-3397; 800/279-6799; info@oryxpress.com. Oryx Press provides publisher/subscription information about all journals indexed in *Current Index to Journals in Education*.

Adjunct ERIC Clearinghouse on Consumer Education <http://www.emich.edu/public/coe/nice/>, National Institute for Consumer Education, Eastern Michigan University, 207 Rackham Bldg., W. Circle Dr., Ypsilanti MI 48197 313/487-2292; nice@online.emich.edu. Links to information about investing, resource lists, full text of publications, legislation, and a calendar of events.

Government-Related Sites

National Center on Education Statistics <http://nces.ed.gov/>, U.S. Department of Education, 555 New Jersey Ave., NW, Washington DC 20208-5574; 800/424-1616. Reports statistical information related to the condition and progress of education in the United States.

U.S. Department of Education, Office of Vocational and Adult Education <http://www.ed.gov/offices/OVAE/>, Mary E. Switzer Bldg., 400 Maryland Ave., SW, Washington DC 20202. Features information about legislation and federal funding for adult and vocational education, as well as press releases, fact sheets, and links to related sources. Search engine indexes across all USDE-sponsored sites <http://search.ed.gov/csi>

Adult Education

AEDNET <http://www.sagrelto.com/elandh/laednet.htm>, listproc @pulsar.acast.nova.edu; subscribe aednet firstname lastname. Members share their ideas and expertise on topics related to all aspects of adult education. The website houses the archives for the listserv.

American Association for Adult and Continuing Education <http://www.albany.edu/aaace/>, 1200 19th St., NW, Washington DC 20036-2422; 202/429-5131. Provides information about the organization, an online newsletter, and website bulletins of interest to adult educators.

American Council on Education <http://www.acenet.edu>, One Dupont Circle NW, Washington DC 20036. Includes information about ACE programs such as HEATH and GED, credentials, leadership development, public affairs, and women and minorities in higher education.

Internet Directory of Literacy and Adult Education Resources <http://sagrelto.com/elandh/home.htm>, MN/SD Regional Adult Literacy Resource Center, University of St. Thomas, St. Paul MN 55105. This extensive directory of literacy and adult education resources includes listservs, gopher sites, websites, and other bulletin boards, e-mail and FTP addresses, and telnet database resources.

Literacy

National Center for Family Literacy <http://www.famlit.org/>, 325 W Main St., Suite 200, Louisville KY 40202-4251; ncfl@famlit.org. Includes a publications list, training opportunities, information on welfare reform, and links to related sites.

National Center on Adult Literacy/ Literacy Online <http://www.literacyonline.org/> or <http://ncal.literacy.upenn.edu/>, University of Pennsylvania, 3910 Chestnut St., Philadelphia PA 19104-3111; 215/898-2100. Contains information about the center, *Issue Briefs*, information on welfare reform, and an online newsletter.

National Institute for Literacy <http://novel.nifl.gov/>, 800 Connecticut Ave., NW, Suite 200, Washington DC 20006; 202/632-1500. Includes nationwide literacy information, programs and activities, links to state sites, policy updates and research papers, current events, listservs, literacy facts, and directories.

Ohio Literacy Resource Center <http://archon.educ.kent.edu/>, 414 White Hall, Kent State University, Kent Ohio 44242-0001; 330/672-2007. Includes links to adult literacy resources, a directory of Ohio adult literacy programs, a calendar of events, job opportunities, teacher resources, and a publications list.

PBS/LiteracyLink <http://www.pbs org/learn/literacy/>. Offers an integrated system of video and online computer technology to help adults advance their GED and workplace skills. LiteracyLink is a partnership of PBS, the National Center on Adult Literacy, the Kentucky Network, and the Kentucky Department of Education.

Distance Education

Distance Education and Training Council <http://www.detc.org/>, 1601 18th St., NW, Washington DC 20009-2529; 202/ 234-5100; detc @detc.org. Provides information about the accreditation of distance edu-

cation programs, high school programs, degree programs, publications, and upcoming events.

Distance Education Clearinghouse <http://www.uwex.edu/disted/home.html>, 432 N. Lake St., Madison WI 53706; 608/262-3786. Includes headlines; articles, bibliographies, and resources; conferences; funding and legislative information as well as a variety of related links.

Resources in Distance Education <http://ccism.pc.athabascau.ca/html/ccism/deresrce/de.htm>, Athabasca University, 1 University Dr., Athabasca, AB T9S 3A3, Canada; 800/ 788-9041. Features information about designing distance education materials; theory and practice; distance education issues; associations; organizations; conferences and special events; and links to technology resources.

Vocational Education

American Vocational Association <http://www.avaonline.org/>, 1410 King St., Alexandria VA 22314; 800/826-9972; avahq@avaonline.org. AVA's site includes information about the organization, membership information, legislative news, products, and conference information.

National Business Education Association <http://www.nbea.org>, 1914 Association Dr., Reston VA 20191; 703/860-8300; nbea@nbea.org. Provides membership information, scholarship information, as well as information about policies and legislation related to business education.

National Center for Research in Vocational Education <http://vocserve.berkeley.edu>, 2030 Addison St., #1674, Suite 500, Berkeley CA 94720-1674; 800/762-4093; AskNCRVE@ncrve.berkeley.edu. Contains information about NCRVE's mission, programs, publications, and services and links to related sites.

Professional Secretaries International <http://www.psi.org/>, 10502 NW Ambassador Dr., PO Box 20404, Kansas City MO 64195-0404; 816/891-6600. Includes information about membership, products and services, PSI certification, current news, and links to related sites.

Skill Standards Network <http://steps.atsi.edu>, American Training Standards Institute, PO Box 23942, Waco, TX 76702. Offers an online database of industry skill standards for a variety of occupations.

Vocational Education Resources <http://pegasus.cc.ucf.edu/~sorg/vocation.html>, University of Central Florida, PO Box 160000, Orlando, FL 32816; sorg@pegasus.cc.ucf.edu. Steven's Sorg's website contains links to sites related to all aspects of vocational education.

Training

American Society for Training and Development <http://www.astd.org/>, 1640 King St., Box 1443, Alexandria VA 22313-2043; 703/683-8100. ASTD's Virtual Community includes a marketplace, a library, conference information, a buyer's guide, the membership directory, as well as T&D Magazine and a book club.

Employment and Training Administration (USDOL) (<http://www.doleta.gov/>. Includes information for those looking for work, needing unemployment compensation information, or seeking the services of the national One-Stop Career Center System. It includes information for employers regarding labor market information and on finding qualified employees.

The Learning Exchange <http://www.learnativity.com/training_FAQs/>; marcia_conner@peoplesoft.com. Marcia Connor has developed an online source for information on learning, training, instructional technology, and other topics related to adult education and improving the way people learn and teach.

Training & Development Community Centre <http://tcm.com/trdev/>. This site includes a variety of information related to Human Resources and Training such as newsgroups, listservs, a chat page, and links to other websites of interest.

TRDEV-L <http://train.ed.psu.edu/trdev-l/>; listserv@lists.psu.edu; subscribe trdev-l firstname lastname. This site contains the archives and digests of the TRDEV-L listserv which is a listserv for training and development and work force education sponsored by Penn State University. Considered by many to be the best training listserv on the Web.

Job Information

America's Job Bank <http://www.ajb.dni.us/>. Offers information about employers, job seekers, the job market, and tips for the job search.

Career Development and Job Search Resources on the Internet <http://www.brynmawr.edu/CDO/netresources.html>. Identifies over 100 websites related to all aspects of the job search. It includes general career information sites as well as those limited to specific occupations.

Occupational Outlook Handbook <http://stats.bls.gov/ocohome.htm>. Contains specific information about thousands of jobs as well as sections on sources of career information, employment projections, finding a job and evaluating an offer, and information about tomorrow's jobs.

School-to-Work

Florida School-to-Work Information Navigator <http://www.flstw.fsu.edu/>, 251 Sliger Bldg., 2035 E. Dirac Dr., Talahassee FL 32310; 800/428-1194; fl-stwcl@mailer.fsu.edu. Features of this website include evaluation reports; conference information; information about STEPS, an electronic support system; publications; and funding sources.

National School-to-Work Office <http://www.stw.ed.gov/>; 800/251-7236; stw-lc@ed.gov. This national site includes information about legislation, financing, conferences, resources, state links, and technical assistance providers.

Financial Aid and School Directories

The College Board <http://www.collegeboard.org/>, 45 Columbus Ave., New York NY 10023; 212-713-8000. Provides information about financial aid, the SAT—including online registration, adult services, international education, advanced placement, the College-Level Examination Program (CLEP), and guides to campuses.

College View <http://collegeview.com>. Provides information about more than 3,700 colleges and universities, financial aid, career planning, and a handy college packing list.

ERIC Clearinghouse on Higher Education/Financial Aid <http://www.gwu.edu/~eriche/FAQ/#financial_aid>, George Washington University, One Dupont Circle NW, Suite 630, Washington DC 20036-1183; 800/773-3741; eriche@eric-he.edu. Offers links to a variety of websites related to financial aid.

Overview <http://www.overview.com/colleges/>. Contains facts on more than 9,000 vocational schools, colleges, and universities.

Peterson's Guides <http://www.petersons.com>, Peterson's, 202 Carnegie Center, Princeton, NJ 08540; 609/243-9111. Includes lists of schools, colleges, and universities as well as information about studying abroad, special schools, distance education, financing education, and applying to college.

Developed with funding from the Office of Educational Research and Improvement, U.S. Department of Education, under Contract No. RR93002001. Opinions expressed do not necessarily reflect the position or policies of OERI or the Department. *Digests* may be freely reproduced.

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Delivering Specialized Training through Company Intranets

Many companies are establishing intranets as a way to provide training that is available only to their designated employees, e.g., their distributors and representatives. Intranet training has all the advantages of Internet or web-based training, such as easy accessibility to information with either a Macintosh or IBM-compatible computer, in-house instruction at times and places that are convenient to the learner. However, intranets have the added advantage of secured access—making the training information available to only authorized employees—which makes it a convenient way for companies to share information about new products and processes and for employees to share company files, programs, and other information with each other.

The quality of intranet training, like all distance education, is dependent on program quality, e.g., "the individual quality of the resources; the degree to which they are maintained; and the ease with which the users can find, select, and use them" (Gilbert 1998, p. 20). Training materials must be updated regularly so that they are reliable and reflect users' training needs and their changing work environment. All resources must be integrated into the intranet system so that they are easily accessible to users.

Pardner Wynn, president of a software developing company called Stanford Testing Systems, claims that "ease of updating is the only sales pitch he needs when it comes to convincing a client of the merits of its authoring tool called IBT author" (Filipczak 1996, p. 31). Wynn contends that intranet training makes sense only in this regard, for if the material is timeless, it can be presented on a CD-ROM (ibid.). Jim Moore of Sun Microsystems supports the value of using intranet training for quick delivery of training. "Getting training out fast is particularly important at Sun because 100 percent of revenues come from products that are no more than 18 months old" (ibid., p. 31).

Intranets, because they are not limited by a "telephone line" network, make possible the addition of audio and video elements. Chat rooms and forums also can be built into training, enriching the interactivity and team building function of an organization's members. The ability to connect trainees with company experts gives intranets an advantage over training delivered on CD-ROM. Another advantage is tracking capability. Live tracking of

employees' progress through company-specific training provided on intranets will not only give trainers the ability to see how long and how well their trainees perform, but also the ways in which they have learned the material (Filipczak 1996).

Successful implementation of intranet training can also provide performance support to employees. Filipczak (1996) describes how Raymond Corporation, a forklift manufacturer in Greene, New York, was able to eliminate the volume of manuals its field people had to carry around as references during their transition from serving simple mechanical to computer-controlled vehicles:

> Raymond opened CompuServe accounts for all of its dealerships and put updated information online so technicians will be able to access the most accurate information, eventually getting in through their laptops. Raymond will shift all of its documentation to an intranet once it has one set up.
>
> Significantly, this solution allowed information to flow both ways. Before Raymond put documentation online, technicians called in when they were having problems, but not when they figured out a good way to fix something. The CompuServe forums give the company a way to collect that corporate knowledge and sent it out to other technicians. (p. 30)

Although intranets can be used to support training of employees, its users may require mentoring to acquire skill in negotiating the system and trainers may require additional training to initiate assessment and evaluation design into company-developed programs.

The following article by Gilbert (1998) provides an update on how intranets are used for learning and performance support. Although designed for serving adult learners, the information is equally relevant to all educators who are attempting to reform their teaching practices by using technology as an instructional tool.

Reading:

Gilbert, L. S. "Intranets for Learning and Performance Support." In *Adult Learning and the Internet. New Directions for Adult and Continuing Education, no. 78*, edited by B. Cahoon, pp. 15-24. San Francisco: Jossey-Bass, 1998.

This chapter discusses the potential of intranets for transforming the learning process, including design and implementation issues.

Intranets for Learning and Performance Support

Linda S. Gilbert

At Company A, Michael checks his calendar and groans. The half-day training session on interviewing skills scheduled for this week involves two hours of travel to the central office. He resents the time lost, especially since he only hires a few people each year. By next time, he'll have forgotten everything he learned.

At Company B, Jenny checks her calendar and notices that she has interviews scheduled later in the week. It's been a while since she filled a position, so she logs on to her company's intranet to review a training module on interviewing. She skims most of the sections, concentrating on the few she truly needs. Jenny also downloads a "job aid"—a list of questions that she can use during the interview. Without leaving her desk, she's prepared for the week.

This scenario illustrates the potential that intranets have to transform the learning process. What exactly are intranets, and how are they being used for learning and performance support?

Intranet Structure and Use

The term *intranet* refers both to the technical infrastructure—the physical connections between computers—and to the total collection of software and information made available through that infrastructure. Technically, an intranet is simply an internal corporate or organizational network, over which information and programs can be shared by multiple users. A *firewall* or security system allows entry to authorized users only, creating a bounded system.

New Directions for Adult and Continuing Education, no. 78, Summer 1998 © Jossey-Bass Publishers

Intranets allow users to share files and programs, access information, and communicate with one another electronically. These capabilities have tremendous potential for organizations on a number of levels, including training and performance support.

This chapter will review the technical aspects of intranets, but will primarily focus on intranet-based training and performance support systems and their implications for adult learning.

Technical Infrastructure. Intranets use the same networking protocols as the public Internet (for example, TCP/IP, SMTP, and HTTP). The primary difference is that an intranet is only available to certain users who have been authorized to access it. These boundaries make it possible to describe an intranet in terms of size, scope, hardware and software, and even user characteristics. Like the Internet, intranets predate World Wide Web technology, but their use expanded exponentially once the Web developed. Though an intranet is not necessarily Web-based, the term often refers to internal networks that publish information on Web servers for access with Web browsers.

The technical advantages of delivering learning and performance support over an intranet include ease of distribution, ease of access, and use of existing infrastructure. These advantages offer immediate cost savings, as well as the promise of transforming work and learning as a result of increased connectivity.

Ease of Distribution. Distributing software and information through an intranet saves duplication, shipping, and other distribution costs. In addition, since shared resources can be reached by anyone on the intranet, each user's individual storage space ceases to be a limiting factor.

Ease of distribution affects not only the initial circulation of software or information but also subsequent maintenance. The original can be updated easily from a central location, alleviating concerns that users may be operating with outdated information, programs, or procedures. Centralized distribution is a genuine advantage for version control, cost savings, and timeliness of information.

An intranet may solve some distribution problems, but it creates others. First, users may not use all the resources they should. Though newer technologies *push* information to the user (that is, they supply information to the user's computer without a specific request from the user), most intranets still rely on users *pulling* (requesting) the material they need. Distribution issues have thus widened from making sure that resources are physically available to attracting the user to them. Second, although the information or program may be easily updated, the ability to access it may not keep pace. Available technology changes rapidly, and not every user within an organization is likely to be able to follow the changes at the same rate. This leads to the issue of access.

Ease of Access. One of the major strengths of intranets is that users can share programs, information, and tools across different computer systems and configurations. This ease of access makes it possible to create a network open to everyone in the organization.

However, technical accessibility is far from uniform. Standards are still evolving, so compatibility between different computer systems holds for only the most basic files. Even simple graphics can vary from computer to computer. Similar computers may be running different configurations of programs, such as the Web plug-ins that extend the functionality of browsers. Further, in large organizations, the cost of equipment replacement ensures that not all computer users will have the most current hardware. In terms of design, these technical constraints mean that audio, video, and downloadable files may not be available to all the end users. Designers have to balance high-end functionality against access issues.

Use of Existing Infrastructure. Use of existing network connections and computers is considered a particularly strong advantage for intranets, particularly for Web-based intranets. The architecture of the Web offers a nonproprietary system that is familiar to most users. Multiple providers for components mean that pricing is competitive and that companies need not fear investing in a dead-end technology.

At the same time, this open architecture makes decisions about hardware and software more complex. Different components may not work together as expected and can require laborious research and troubleshooting. The rapid pace of technological development makes system maintenance a moving target. To use the current infrastructure, some functions available on stand-alone systems have to be reconsidered. For example, network bandwidth limitations still hamper implementation of real-time audio or video over an intranet, which in turn limits the use of existing computer-based training that requires multimedia.

While it is true that recent advances continue to make intranet technology far more feasible, maintaining and selecting an appropriate system requires effort, expense, and expertise.

Learning and Performance Support. Although critical, technical considerations are only a small part of the picture. The value of an intranet lies in its content and use. Intranets permit just-in-time or on-demand training on an individual basis through improved delivery of learning resources. They also promote the development of shared resources and collaborative work practices.

Review of Learning and Performance Resources. Intranet resources include adaptations of existing, non-networked resources, such as information from printed materials, computer-based training, and electronic performance support systems.

The term *computer-based training* describes the delivery system more than the instructional content. Traditional computer-based training usually consists of tutorials, drills, simulations, or instructional games. However, computers are also being used to build more open-ended *learning environments* to encourage exploration and problem solving (Alessi and Trollip, 1991; Cognition and Technology Group at Vanderbilt, 1991; De Grave, Boshuizen, and Schmidt, 1996; Goodrum, Dorsey, and Schwen, 1993). Descriptions of such learning environments tend to merge with those of electronic performance support systems (EPSS).

The primary difference between a learning environment and an electronic performance support system is that the focus of an EPSS is not learning, per se: an EPSS represents a blend of learning and work, with an emphasis on performance as the ultimate goal (Rosenberg, 1995). Since individuals can access updated information and procedures when they need them, some learning becomes unnecessary. For example, an EPSS for a chair manufacturer might include a database containing colors, styles, and prices that users can access when talking to a customer. Instead of memorizing all the options that are available, salespeople can concentrate on finding combinations that fit the customer's needs. Using performance support to minimize rote learning in this way reduces information overload for workers and allows them to concentrate on higher cognitive processes.

A number of interrelated fields contribute to perspectives on EPSS: performance technology, instructional technology, knowledge engineering, information engineering, business process reengineering, and systems thinking (Laffey, 1995; Raybould, 1995; Rosenberg, 1995). Initial developers of electronic performance support systems conceived an EPSS as an electronic system that provided integrated, on-demand access to information, advice, learning experiences, examples, and tools to enable a high level of job performance with a minimum of support from other people (Gery, 1991). The goal of an EPSS is "to provide whatever is necessary to generate performance and learning at the moment of need" (Gery, 1991, p. 34).

Current definitions of electronic performance support systems have shifted their focus from specific components to overall impact. Performance-centered design is usually cited as one of the hallmarks of an EPSS (Gery, 1995a; Laffey, 1995; McGraw, 1997; Raybould, 1995, 1997). Performance-centered design reflects the user's goals within a work environment, communicating what the user needs to do to achieve those goals and providing support in carrying out the associated tasks (Dickelman, 1995; McGraw, 1997; Norman, 1993). In addition to making the right tool available at the right time, a good performance system clarifies relationships, sequences, priorities, decisions, and standards related to the task (Gery, 1995b; McGraw, 1995; Raybould, 1995; Rosenberg, 1995).

In practice, performance and learning are so deeply interconnected that systems designed for performance support often support learning as well. Situating information and learning resources in a work context provides a natural way for learning to take place, especially since adults are usually task-centered, self-directed learners (Dorsey, Goodrum, and Schwen, 1993; Duchastel and Lang, 1995–96; Ference and Vockell, 1994; Merriam, 1993; Schwen, Goodrum, and Dorsey, 1993; Wilson, 1993). Nonetheless, EPSS development has been driven by businesses rather than by educational institutions (Hudzina, Rowley, and Wager, 1996).

Advocates of performance support systems—a term that includes learning experiences such as computer-based training—identify advantages for both individuals and organizations. Table 2.1 summarizes some of the major benefits cited for each.

Table 2.1. Advantages of Performance Support Systems

For Individuals	*For Organizations*
• Access to information bases • Just-in-time, on-demand learning experiences, focused on user's needs • Access to procedural guidance (job aids, checklists, and so on) • Collection of tools, templates, and guidance to support performance • User selection of resources and strategies • Reduced demands on memory • Situated learning in task context	• Consistent training • Reduced travel costs • Procedural consistency • Rapid performance for novices

For individuals, just-in-time access to information, tools, and training enables them to focus on their goals. Without the demands of a class schedule, individuals can linger on unfamiliar material and not waste time on things they already know. Users select the resources that they need, so individuals can customize their use of the system.

For organizations, on-demand training reduces travel time and increases the applicability of learning to the individual's needs and immediate situation. These factors improve productivity while lowering training costs. Performance support tools and templates also allow less experienced workers to perform more advanced tasks than they would ordinarily be capable of, so that more experienced—and higher-paid—workers can concentrate on tasks where their specific expertise is required (Thomas, Baron, and Schmidt, 1994).

Advantages of Intranet Connections. The advantages of stand-alone training or performance support systems are enhanced by placing them on an intranet. A connected system can not only facilitate individual learning but ensure that new knowledge is captured, recorded, and made available to others in the organization (Laffey, 1995; Raybould, 1995; Rosenberg, 1995).

The immediate implications of intranet connections are that all the components of a performance support system—training, information, tools, and other resources—can be consistent, up to date, and available from any individual's workstation. Performance support using Web technology offers the additional advantage of a consistent and familiar interface, reducing cognitive load.

At the same time that an intranet allows more access to existing resources, it usually leads to the creation of more resources. Web pages are not difficult to produce, and departments may choose electronic publishing for information once distributed in print: reports and updates, company handbooks and policies, organizational charts, and so forth. They may also create resources for their workers and internal clients and share them with others in the organization.

From this array, users acquire the resources they need, tailoring their collections in much the same way they customize their workspaces (Sherry and Wilson, 1996).

For the organization, the scope of electronic performance support systems can be enlarged to include entire work groups, sometimes in ways that transform their tasks (Laffey, 1995; Raybould, 1995; Rosenberg, 1995; Ryder and Wilson, 1996; Scales and Yang, 1993; Thomas, Baron, and Schmidt, 1994). Collaborative group work can be better supported, leading to increased sharing of information between users. For example, imagine a computer-repair company that has technical engineering support in different geographical regions. If the engineers can add new problems and solutions to a shared database, they can draw on the expertise of all their colleagues to solve problems instead of locally reinventing the solution everywhere the same problem appears. Thus, as members of an organization learn, their new knowledge can become part of the performance support system, disseminated to others who can use it. *Dynamic EPSS* is one name for a performance support system to which users contribute (Laffey, 1995). Instead of delivering a static performance support system, the intranet becomes an evolving performance support system composed of shared resources distributed throughout the organization.

Concerns and Issues

The explosion of new resources supported by an intranet can be a tremendous advantage to individuals and organizations. It can also be a tremendous disadvantage, contributing to information overload. Problems occur when the key characteristics that define a true performance support system—performance-centered design and integration with the working environment—are neglected during resource development and overall system design. Unbridled development and lack of organization can lead to fragmented and poorly utilized resources.

The value of an intranet depends on three factors: the individual quality of the resources; the degree to which they are maintained; and the ease with which the users can find, select, and use them. Resources are sometimes developed without adequate consideration of the users' needs and working environment. Once developed, they may not be adequately updated, so that they become unreliable. And even when adequately maintained, they may be fragmented and hard to find; separate resources need to be integrated into an overall system, particularly in larger intranets where locating information becomes a challenge.

Factors external to the system may affect its impact as well. Users may lack skills for choosing among the resources appropriately. More significantly, organizational policies, procedures, or culture can create unexpected barriers. Imbalances between individual and organizational needs—for example, systems that simplify processes to the point that they deskill workers—are also a major concern (Clark, 1992; Hudzina, Rowley, and Wager, 1996; Nickerson, 1993; Salomon, 1993; Scales and Yang, 1993).

Successful implementation of an intranet depends on thoughtful initial assessment, a wide array of development expertise, a commitment to maintenance, and iterative evaluation and redesign. In addition, it usually requires attention to the larger organizational context. It may include strategies such as training in its use, modification of policies and procedures, and alignment of individual and organizational incentives (Clark, 1992; Kling and Jewett, 1994; Nickerson, 1993; Sherry and Wilson, 1996). Processes that stress iterative design, incremental development, regular evaluation, and participation from the end users improve chances of success (Laffey, 1995; Raybould, 1995).

Implications for Adult Learning

On the surface, working with well-designed performance support systems satisfies many of the conditions conducive to adult learning. Characteristics of adult learners include an independent self-concept, a background of prior experience, a natural orientation toward learning, and strong internal motivation (Pratt, 1993). Recent theories involving the context of learning suggest that learning is to some extent situation-specific; thus, work provides a natural setting for adult learning (Brown, Collins, and Duguid, 1989; Dorsey, Goodrum, and Schwen, 1993; Goodrum, Dorsey, and Schwen, 1993; Lave and Wegner, 1991; Wilson, 1993). As users call on the resources of the system to achieve their goals, they have the opportunity to build their expertise.

However, such learning is not a given. It requires not only experience but reflection (Schön, 1983). Intranet users may not have the time, energy, or personal motivation to pursue learning; they may simply choose to get their work done as quickly as possible. In addition, novices are often unable to accurately assess their learning needs or the strategies to best fulfill them. Moreover, a system may be designed so that human skills are undeveloped (Salomon, 1993; Scales and Yang, 1993).

As technology increasingly supports knowledge work, one of the most critical decisions involves distinguishing situations in which learning is desirable from those in which it represents unnecessary effort (Brown, Collins, and Duguid, 1989; Clark, 1992, 1995; De Grave, Boshuizen, and Schmidt, 1996; Ference and Vockell, 1994; Scales and Yang, 1993; Wilson, 1993). Identifying what needs to be learned—or not learned—in a technical society is a question with enormous implications for educators.

Users will need help in learning how to best use the resources available to them. To maximize the use of these systems for performance and learning, individuals and work teams need to develop both technical skills and conceptual skills. Supporting performance support involves coaching people in how to use the system and tools effectively (Sherry and Wilson, 1996). At the same time, it involves encouraging reflective practices that allow people to learn from their work activities—and that maximize their ability to learn from performance support systems (Brown, Collins, and Duguid, 1989). As Martin Ryder and Brent Wilson said about the Internet, "Since we can no longer filter

and select proper materials for our students, our highest calling as educators will be to support students in developing such discipline for themselves" (Ryder and Wilson, 1996, p. 651). The same is true for intranets and performance support systems.

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Technology as a Facilitator of Learning

Technology is a means of supporting learning by providing unique opportunities for teachers to expand their teaching approaches and learners to engage in new ways of learning. If the Internet, intranets, and World Wide Web are used only to automate traditional teaching and learning practices, their impact on student learning outcomes will be minimal. To be an effective tool for educational reform, technology must facilitate new models for teaching and learning (Mann 1998).

The most recent emphasis in educational reform literature focuses on the benefits of contextual learning, cognitive apprenticeships, problem-based instruction, and student-centered classrooms (Brown 1998a). The application of these teaching and learning practices in vocational and technical education reflects a constructivist theory of learning. It promotes actively engaging learners in manipulating and directing their own learning and construction of knowledge. Although technology can offer realistic and interactive environments for learning, certain changes must occur in the classroom so that student involvement with new technologies fosters educational outcomes (Mann 1998):

- Activities should be student centered rather than teacher centered.
- Instruction should be directed to small group rather than whole class participation.
- Student participation should be exploratory rather than structured.
- Learning should be collaborative rather than competitive.
- Problems and activities should have value in the real world, not just the classroom.

Ways in which technology can be used to change curriculum and instruction and support new models of teaching and learning include facilitation of *constructivist learning principles*, *cognitive development*, and *equity*.

Relating to Constructivist Learning Theory

Constructivism is a theory about how people learn. It contends that people construct meaning through their interpretive interactions with and experiences in their social environments. It presumes that prior knowledge and experiences play a significant role in learning and form the basis for subsequent actions. It focuses the learner's attention on the "why" of learning and opens the door to critical thinking and intellectual development (Manus 1996).

There are several ways in which technology facilitates constructivist learning. "Eastmond (1995) highlights the ways that computer discussion requires and facilitates learning-how-to-learn skills, such as locating and accessing information resources, organizing information, conducting self-assessment, and collaborating" (Kerka 1996, p. 2). Hobaugh (1997) emphasizes the interdependent roles of teacher and student in constructivist teaching and learning with each assuming responsibility for constructing their own meaning from information through their interactions in a learning community.

A summary of how technology facilitates constructivist learning is presented in the following excerpt from Brown (1998a, pp. 41-43).

The Internet offers multiple pathways to learning, using hypertext/hypermedia as a constructivist learning tool. Carefully designed materials presented online can assist individuals' construction of knowledge by providing alternative pathways to information and making that information easily accessible from any location that has system facilities.

Farquhar et al. (1996) note that, in the past, computer-based instruction reflected a stimulus-response approach. Material was organized in a linear manner to reflect the author's knowledge structure, thus limiting the learner's ability to form their own structures (O'Carroll 1997). In fact, "highly structured and repetitive interactions delivering immediate feedback are still standard features" (Farquhar et al. 1996, p. 212). However, today, the use of hypertext, which organizes information according to discrete elements, allows learners to control the search for knowledge. It offers learners access to information in ways that are consistent with their individual learning styles and enables them to forge their

own linkages between bodies of knowledge. It facilitates a self-directed approach to learning and actively engages learners in higher order thinking and problem solving (O'Carroll 1997).

Engagement

Hypertext/hypermedia is its own motivator in that it accommodates the diverse learning styles of learners and allows the integration of aural, visual, and textual elements. Kerka (1998) describes the two different approaches to using hypermedia: the approach of field independent (FI) individuals (those who perceive details and rely on internal cues) and that of field dependent (FD) individuals (those who use their entire surroundings, including other people, to process information). According to Kerka, "FIs perform more efficient searches in shorter times and are more comfortable jumping around ("surfing") in hyperspace. FDs more often report feeling disoriented or lost, navigate more linearly (frequently using Back or Home keys), and tend to follow sequences instead of jumping around, accepting the environment as presented" (p. 1). "FIs tend to be left-brained, analytical thinkers; FDs tend to be right-brained, global thinkers" (Brown 1998b, p. 1). However, research shows that in spite of the fact that their approaches are different, both FIs and FDs perform well using hypermedia (Kerka 1998).

Inquiry

As a tool for teaching and learning, the Internet affords the benefits of libraries and publishing infrastructures without the drawbacks of limited hours of operation, fixed location, extensive user time, and high publishing costs. It offers access to vast amounts of information that continue to expand daily. It facilitates inquiry by affording users access to various databases from which they can make their own selection of hits and documents to retrieve. From a learner-centered perspective, hypertext indexes enable learners to take charge of their own learning and self-select the text passages that are uniquely interesting to them and relevant to their purposes (Ryder and Wilson 1996). World Wide Web environments provide opportunities for learner interactions that enable learners to "create new relationships with knowledge and new representations of knowledge" (Conceição-Runlee and Daley 1998, p. 41). In comparison to traditional paper/pencil types of information exchanges, learner interaction with information technology is "more dynamic and the knowledge structures are more likely to reflect each reader's unique approach to learning and to the subject matter" (O'Carroll 1997), p. 121.

The following excerpts from Ginsberg (1998, pp. 43-45) discuss the importance of using technology to engage students in activities that are "complex, realistic, and may have more than one reasonable methodology."

Just as real world problems and situations often require the input and support of a number of people working together, learners can work together in teams to collect information, brainstorm and weigh alternatives, plan, and come to a solution. For example, a class with Internet access could be given the task:

> *I need help planning my trip. This winter vacation I want to spend a week in a place with a temperature that is likely to be at least 80 degrees. I like to swim so a beach would be nice. I also like to go site seeing so there should be something of interest in the area. I don't own a car so you have to decide how I will travel and where I will stay. I have $1000 to spend on this trip. Please write me a letter and tell me of the plans you have for my trip, how your plan meets my requirements, and how much everything will cost.*

Such a problem does not have one answer or one solution path, the task is reasonable and realistic, and the information needed is accessible. Working in pairs or groups is efficient and more fun, and it reduces the possibility that someone will get stuck on one aspect of the problem and not be able to progress. Learners have an opportunity to communicate orally and in writing and practice writing a business letter. The activity has research, geography, and math components. Activities such as this can help learners develop and hone skills in a holistic environment. The emphasis is not on acquiring discrete skills but rather on developing problem-solving strategies and applying knowledge and skills in meaningful ways.

In such an instructional environment, the role of the teacher is very different from the "sage on the stage." The teacher is not the sole source of information; indeed the teacher will not know in advance the "answers" that the learners propose. Instead, the teacher provides guidance as needed to groups of learners. Upon completion of the activity, the teacher might facilitate a discussion of the problem-solving approaches and group processes learners used.

In such an environment, learners are much more independent and active than in an educational environment that is focused on the acquisition of discrete subskills. They are expected to gather information and make, communicate, and justify their decisions. Their own experiences can contribute to their work.

The following ERIC Digest addresses some of the current perspectives on technology and learning, describing technology as curriculum, as a delivery mechanism, as a complement to instruction, and as an instructional tool for teaching and learning.

Readings:

Imel, S. *Technology and Adult Learning: Current Perspectives. ERIC Digest No. 197* (1998b)

DIGEST NO. 197

ERIC Clearinghouse on Adult, Career, and Vocational Education

by Susan Imel

1998

EDO-CE-98-197

Technology and Adult Learning: Current Perspectives

Throughout the 20th century, changes in technology have had social and economic ramifications. Although each successive wave of technological innovation has created changes to which adults have had to adjust, "what perhaps differentiates earlier technological changes from today's is the current emphasis on educational applications" (Merriam and Brockett 1997, p. 113). The most pervasive of the technologies with educational applications are the Internet and World Wide Web, but other technologies can also be used to facilitate adult learning. In considering the role of technology in adult learning, adult educators are faced with a number of challenges, including how to respond to technology and how to exploit it without diminishing the learning experience (Field 1997). The purpose of this *Digest* is to review some current perspectives about technology and adult learning. It begins by describing approaches for integrating technology into adult learning and then considers how technology can be used to support and expand adult learning.

Integrating Technology into Adult Learning

Ginsburg (1998) presents a helpful way to think about integrating technology into adult learning by proposing four basic approaches: technology as curriculum, delivery mechanism, complement to instruction, and instructional tool . Each approach is summarized here, including its benefits and limitations.

Technology as Curriculum

Not only can adults learn content through technology, they can also learn about technology itself (Merriam and Brockett 1997) and develop the skills to use it competently. An example of the technology as curriculum approach is the course, "Exploring the Internet." Offered by the Georgia Center for Continuing Education, the 10-hour, noncredit evening course is designed to provide adults with the concepts and skills for using Internet applications such as e-mail and the Web (Cahoon 1998). The benefits of this approach include the opportunity to address each aspect of the technology in a clear, structured manner; little or no distraction from peripheral learning issues or goals beyond those of learning the technology; and efficiency in acquiring a discrete set of technology skills that can be applied in different settings. The major limitation of the approach is the narrow focus on the technology and the skills to use it. When technology skills are acquired in an isolated environment, they may not be easily transferred and applied by the learner in meaningful ways. In addition, if the learner lacks an opportunity for practice, the skills may deteriorate (Ginsburg 1998).

Technology as a Delivery Mechanism

A second approach for integrating technology into adult learning is to use it as means for instructional delivery. In basic skills instruction, an example of this approach is the individualized learning system (ILS). ILSs are designed to provide instruction and practice in a set of subskills that together form an entire curriculum. Other examples include televised instruction and instruction delivered through video or audiotapes. Although this approach lends itself to individualizing instruction, for the most part, the learner works in isolation from other learners and, in some instances, the teacher. Also, few, if any, technology skills are acquired. For example, ILSs require learners only to retrieve the software program, identify themselves, and employ a limited number of keystrokes. They are also costly (ibid.), a limitation that does not extend to televisions, VCRs, and audiotape players, which are more readily available.

Technology as a Complement to Instruction

In adult learning settings, technology is frequently used to complement instruction and extend learning. In adult basic education, for example, a learner might use a piece of software to practice a weak or underdeveloped skill area that has been the focus of classroom instruction (ibid). Another example of this approach is the use of Internet activities and assignments to supplement traditional distance learning (for example, telephone-supported correspondence study) (Eastmond 1998). In this approach, the instructor remains the primary coordinator of instruction and the extent to which technology is integrated with traditional instruction depends upon both the teacher's style and the kind and type of technology available. Use of technology to complement instruction extends the instruction beyond the knowledge and experiences of the teacher and can also provide opportunities for the teacher to learn. The approach also provides learners the opportunity to practice skills in private, and it can promote self-direction by allowing learners to supplement instruction in ways that meet their individual needs (Eastmond 1998; Ginsburg 1998).

A major limitation of this approach is the kind and type of material available that is suitable for adults and that promotes good adult learning practices. In the case of software, for example, teachers must take time to locate, review, and select software packages. Also, drill and practice, which does not involve the development of high-level cognitive skills such as problem solving, is the focus of many software programs. The cost of acquiring the most suitable software may also be a limitation. Finally, to avoid technology simply becoming an "add-on," teachers need to ensure that the use of technology is congruent with the primary instruction (Ginsburg 1998).

Technology as an Instructional Tool

When technology is used as an instructional tool, it is integrated into instructional activities. The primary instructional goals and outcomes remain the same, but technology is used to enrich and extend them. Although acquiring technology-related skills is not the primary focus in this approach, instructional activities frequently support their development. In completing writing assignments, for example, learners develop skills in word processing (ibid). The spread of the Internet and the World Wide Web has made this approach very common in distance education and in other education and training settings. Distance education delivered via computer conferencing is one example (Eastmond 1998). Technology has also been used to extend adult literacy curricula in a multilevel classroom by enabling learners to have immediate access to Internet-based resources that provide content of interest to their life situations and allow for teaching of skills in context (Cowles 1997). This aproach allows learners to develop skills and have experiences with technology in ways that will benefit them outside the instructional setting.

When compared to the first approach, technology as curriculum, learners may more readily transfer the technology skills learned to other settings. When used as an instructional tool, the Internet provides access to information and resources that might not ordinarily be available (Ginsburg 1998). As will be discussed more fully in the next section, this approach can also be used to broaden and enhance adult learning experiences. A limitation of this approach is the willingness of instructors to adapt or develop instructional activities. In adult basic education, a shortage of curricular resources that integrate and benefit from technology exists. Access to technology for either educational providers or learners can also be a problem. Finally, an instructor's understanding and ability to use the technology may also be a limitation (ibid).

The four approaches presented here are all currently used for adult learning, and they are helpful in thinking about how to integrate technology into adult learning. How technology can be structured to capitalize on the characteristics of adult learners must be considered as well.

Supporting and Extending Adult Learning through Technology

Like any other instructional tool, technology can serve to perpetuate poor educational practice or it can become a means for transforming learning. In formal learning settings, leadership for using technology effectively rests with the instructor. However, "[technologies] are not neutral tools. Their use will reflect whatever values the educator holds—consciously or subconsciously—about her/his relationship with learners, and their use will invariably bring advantages and disadvantages" (Burge and Roberts 1993, p. 35).

Technology can enhance adult learning because it has the potential to increase flexibility, provide access to expertise, facilitate discussion among learners who cannot meet face to face, reduce feelings of isolation often experienced by nontraditional learners, increase learner autonomy, and support and promote constructivist and collaborative learning (Burge 1994; Cahoon 1998; Eastmond 1998; Field 1997). However, because "technology in and of itself does not promote learning" (Burge and Roberts 1993, p. 35), its use does not obviate the educator's responsibility for structuring the learning to ensure these benefits result.

Part of using technology effectively is understanding what adults want in the learning environment when technology is employed. Suggestions for structuring environments include the following (adapted from Burge and Carter 1997, pp. 5-6):

- Create a place where learners can collect important ideas, express themselves, and feel some security that they are going in the right direction.
- Provide fast and productive access to help when it is needed.
- Because adults generally have two basic intrinsic motivating drives of autonomy and affiliation, provide a learning environment that promotes both independent and interdependent activities with cognitive as well as psychosocial support.
- Because adults value economy of effort (i.e., they don't want to waste time), ensure that the learning tools are intuitive and essential for the immediate task.

The literature contains a number of examples of how technology is being used to promote and extend good practice in adult learning. Cowles (1997) uses the Internet to support her beliefs that skills are learned best when imbedded in context of interest to the learner and when learning is active. She has found the Internet to be a tool that can be used to individualize instruction but at the same time keep it in the context of the group and program goals. Pobega (1996) describes how he was able to use the Internet to involve students more directly in producing a student newspaper that he had edited for 5 years with the goal of developing their literacy skills. Work on the newspaper resulted in students developing writing skills, engaging with technology, and working collaboratively as an editorial team. Technology enabled Pennsylvania practitioners to overcome two issues in professional development: isolation and the effective use of practice-based professional development (Strunk and Fowler-Frey 1996). The Internet allowed 10 adult basic education practitioners engaged in action research projects to form a research community that provided not only support and encouragement but also led to critical reflection on their practice. As reported by Eastmond (1998), studies of adult learning through online instruction found that learners engaged in knowledge construction, collaborative learning, reflection, and interactivity. However, as Eastmond points out, none of "these elements are inherent in the technology but must be fostered by the course design, instructor engagement, and student behavior" (p. 37).

Conclusion

Adult educators may once have been able to ignore the educational applications of technology, but that is no longer the case. The tools that can support and advance the goals of adult learning are a part of everyday life and are used by millions of adults on a daily basis. Unless adult educators become proactive in developing opportunities that will provide advantages for adult learners, they may end up watching the exploitation of technologies from the sidelines (Field 1997). Their primary role should be to ensure that the focus is on the learning and not the technology. "The spotlight should first fall on the conditions, dynamics and outcomes of learner activity, in ways that promote learner self-esteem and their competence as proactive learners" (Burge and Roberts 1993, p. 37).

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Developed with funding from the Office of Educational Research and Improvement, U.S. Department of Education, under Contract No. RR93002001. Opinions expressed do not necessarily reflect the position or policies of OERI or the Department. *Digests* may be freely reproduced.

CENTER ON EDUCATION AND TRAINING FOR EMPLOYMENT
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Supporting Cognitive Development

Cognitive learning refers to the ways people process information. "It reflects Kolb's description of learning as a cyclical process by which one moves from concrete experiences, to reflective observations, to abstract conceptualization, and, finally, to active experimentation" (Brown 1998b, p. 1). Distance learning and web-based training can involve students in active rather than passive roles, engaging them in thinking, watching, experiencing, and doing.

Cognitive development is enhanced when students are free to pursue learning in keeping with their own learning preferences. Distance education and web-based training can be designed to allow for learning style diversity. This characteristic of technology-aided learning is especially significant as learning styles and the creation of effective learning environments facilitate the development of the higher-order thinking skills required in the high-performance workplace. Today's workers "must be able to analyze and interpret information to solve problems for which there are no given answers; connect facts, concepts, and processes; integrate functional capacities and behaviors; and transfer thinking across environments" (ibid.).

Vocational educators have a history of varied instructional practices through their promotion of hands-on learning and knowledge transfer. This tradition is now expanded with the use of technology that enables students to direct their own participation in knowledge construction. On the World Wide Web, "home page construction embodies many of the constructivist premises, including the construction of understanding in response to the author's interaction with their professional, personal, and social world" (Slough and McGrew-Zoubi 1996, p. 5). Such technologies allow the teacher to move from a sole knowledge source to a facilitator of knowledge development.

One strategy that can incorporate coaching as a strategy for developing critical thinking skills is the use of Guided Web Exploration (GWE), which includes—

> (1) scenario or hypothetical setting with which the learner can identify; (2) challenge to the learner to solve a problem or create; (3) resources for information accessible via the Internet; (4) suggestions for plan of action, critical thinking, and problem-solving; (5) definitions of terms;

(6) learning outcome in the form of a product; and
(7) opportunity for reflection and self-assessment of the learning experience" (Baker 1997, p. 2). In using Guided Web Exploration, the instructor/trainer provides tips to help learners navigate their own ways to problem solution. For example, he/she might set criteria for selection of Internet information "because undocumented, misleading, incomplete, inappropriate, inaccurate, and outdated information proliferate on the Internet. (ibid., p. 4)

Another way in which technology facilitates learning is by supporting the reflective process. Internet exchanges provide students with "opportunities to confront multiple viewpoints and multiple sources of information to explore solutions to real educational issues" (Collis 1997, p. 126). In online communication with others, learners must take time to think about their comments before they can articulate them in writing. Thus, the potential for learner reflection is greater than in face-to-face communications. Some believe that the relative anonymity of Internet chat rooms also contributes to learning by giving students freedom to ask more questions than they might in face-to-face situations with their peers (McCollum 1997).

Two publications that address the role of technology in cognitive development follow. ***Learning Styles and Electronic Information*** (Kerka 1998) provides guidance on how educators can help learners use electronic information, and ***Using the Internet in Career Education*** (Wagner 1999) provides information on identifying, evaluating, selecting, and using the Internet in a career education classroom. Each of these publications offers suggestions that educators can use in their efforts to use technology to improve their teaching and learning practices.

Readings:

Kerka, S. *Learning Styles and Electronic Information. Trends and Issues Alert* (1998)

Wagner, J. O. *Using the Internet in Career Education. Practice Application Brief No. 1* (1999)

TRENDS AND ISSUES ALERTS
by Sandra Kerka 1998
ERIC Clearinghouse on Adult, Career, and Vocational Education

Learning Styles and Electronic Information

It has been said that the World Wide Web and other hypermedia-based systems are modeled on the way the brain processes information (Ayersman 1993; Kussrow 1997; Small and Ferreira 1994). Individuals process information by using distinctive patterns known as learning styles to select, organize, and store it. Emerging research findings demonstrate a relationship between learning styles and approaches to using hypermedia, especially in terms of success with information retrieval. This *Alert* highlights some of these findings and provides an annotated list of resources so that adult educators can help learners make the best use of electronic information.

Among the most widely used conceptions of learning styles is Witkin's Field Dependence (FD)/Field Independence (FI). Much of the hypermedia research compares FI individuals, who perceive details and rely on internal cues, with FDs, who use their entire surroundings—including other people—to process information. Although hypermedia integrate aural, visual, and textual elements that accommodate various learning styles, most findings (Chou and Lin 1997; Cline 1991; Hsu et al. 1991; Kim 1997; Leader and Klein 1994) show that FIs perform more efficient searches in shorter time and are more comfortable jumping around ("surfing") in hyperspace. FDs more often report feeling disoriented or lost, navigate more linearly (frequently using Back or Home keys), and tend to follow sequences instead of jumping around, accepting the environment as presented. This may be because FIs use active approaches such as hypothesis testing; form mental models of how the Internet is constructed and information is organized, revising them continuously; use metacognitive strategies (planning, monitoring, reflecting, regulating); and transfer concepts and search methods to new situations. FDs prefer to be guided and want a global overview, such as explicit menus listing all possible choices (Chou and Lin 1997). Liu and Reed (1994) found that both FIs and FDs perform well, but approach the task differently.

Other variables affect information-seeking processes: motivation, perceived importance or value of information, self-efficacy, problem-focused or emotion-focused problem-solving styles, prior computer experience or subject knowledge, degree of self-direction, and design of the interface (Grabowski and Curtis 1991; Hsu et al. 1994; Kim 1997; Small and Ferreira 1994). In addition, the use of hypermedia itself can influence the development of different strategies or approaches (Chou and Lin 1997).

Cline (1991) envisions a day (perhaps not far off) when we will carry cards coded with learning style information and individual profiles that we will plug into a machine, which will adapt itself to our preferred style. Until that happens, educators helping adults learn to be lifelong information seekers (as well as designers of hypermedia systems) should bear in mind that the average user learns only what is needed to perform a task (ibid.). "A rich array of support is possible within the information landscape" (Hillinger 1994, p. 37). The key is to recognize the implications of one's preferred learning style; know how to select and use hypermedia tools such as indexes and site maps that match one's style; and develop the ability to create mental models and use metacognitive strategies.

Resources

Ayersman, D.J. "An Overview of the Research on Learning Styles and Hypermedia Environments." Paper presented at the annual convention of the Eastern Educational Research Association, Clearwater, FL, February 1993. (ED 356 756)
Provides a conceptual foundation for the development of hypermedia as a tool for addressing learning style differences. Examines information processing theory, semantic networks, concept webbing/mapping, frames/scripting, and schema theory.

Buckley, J. "Multimedia Instruction: One Solution to the Development of Diverse Learning Environments." In *Theories of Learning. Selected Papers from the 4th Annual Conference of the Institute for the Study of Postsecondary Pedagogy*, edited by R. Kelder, pp. 69-76. New Paltz: State University of New York, 1994. (ED 394 408)
Discusses the implications of Hanson, Silver, and Strong's typology of learning styles (sensing feelers, intuitive feelers, sensing thinkers, intuitive thinkers) for the development of multimedia.

Cahoon, B. "Teaching and Learning Internet Skills." *New Directions for Adult and Continuing Education* no. 78 (Summer 1998): 5-13.
Presents a cognitive view of how adults learn to use the Internet and describes a practice-oriented approach to teaching basic Internet skills.

Choo, C.W.; Detlor, B.; and Turnbull, D. "A Behavioral Model of Information Seeking on the Web." Paper prepared for the annual meeting of the American Society for Information Science, Pittsburgh, PA, October 1998. <choo.fis.utoronto.ca/fis/respub/asis98/default.html>
A study of how managers and information technology specialists use the Web to find work-related information was used to develop a behavioral model that relates motivations (strategies and modes of searching) and moves (tactics used to find information).

Chou, C., and Lin, H. "Navigation Maps in a Computer-Networked Hypertext Learning System." Paper presented at the Annual Meeting of the Association for Educational Communications and Technology, Albuquerque, NM, February 12-16, 1997. (ED 403 882)
Two of four types of navigational maps used in a hypertext system had significant effects on the number of search steps used, search efficiency, and development of cognitive maps. Cognitive style (field dependence/independence) had a significant effect on the development of cognitive maps but not on search performance.

Cline, J.A. "Cognitive Style in System Design." Master's thesis, Kent State University, 1991. (ED 343 586)
Examines how people interact with information retrieval systems in order to develop a model of a system that accommodates diverse user styles.

Eklund, J. "Cognitive Models for Structuring Hypermedia and Implications for Learning from the World Wide Web." Paper presented at AusWeb 95, First Australian World Wide Web Conference, Ballina, New South Wales, July 1995. <http://www.scu.edu.au/sponsored/ausweb/ausweb95/papers/hypertext/eklund/index.html>
Discusses cognitive models that define learning as the accumulation and organization of knowledge structures. Compares these models to the structure of hypermedia systems and addresses ways to maximize learning in hypermedia environments.

Gozzi, R., Jr. "Entertainment as/in Education." Paper presented at the 81st annual meeting of the Speech Communication Association, San Antonio, TX, November 1995. (ED 391 205)
Suggests that the new cognitive style fostered by electronic media could be called "empathy at a distance." Identifies differences between those trained in the ways and skills of print media and those more attuned to the style of electronic media.

Grabowski, B.L., and Curtis, R. "Information, Instruction and Learning." *Performance Improvement Quarterly* 4, no. 3 (1991): 2-12.
Discusses navigational, cognitive, and motivational issues related to learning with hypermedia-based information systems.

Hillinger, M.L. "Using Hypermedia to Support Understanding of Expository Text." In *Recreating the Revolution. Proceedings of the 15th Annual National Educational Computing Conference*, edited by D. Ingham. Eugene, OR: International Society for Technology in Education, 1994. (ED 396 668)
Illustrates the ways Responsive Text can enhance hypermedia to compensate for specific problems users have with decoding, comprehension monitoring, and other aspects of text.

Hsu, T.E.; Frederick, F.J.; and Chung, M.L. "Effects of Learner Cognitive Styles and Metacognitive Tools on Information Acquisition Paths and Learning in Hyperspace Environments." In *Proceedings of the 16th National Convention of the Association for Educational Communications and Technology*, edited by M.R. Simonson et al. Washington, DC: AECT, 1994. (ED 373 721)
Investigated the effects of the presence or absence of metacognitive tools on field-independent and field-dependent users of a hypermedia system.

James, W.B., and Gardner, D.L. "Learning Styles: Implications for Distance Education." *New Directions for Adult and Continuing Education* no. 67 (Fall 1995): 19-31.
Reviews types of learning styles and suggests ways to enhance distance education instructional design for different learning styes.

Kim, K.S. "Effects of Cognitive and Problem-Solving Styles on Information-Seeking Behavior in the WWW: A Case Study." *Interactive Multimedia Research Course Student Projects, University of Texas at Austin*, 1997. <http://www.edb.utexas.edu/mmresearch/Students97/Kim/index.html>
Compares performance of people with field-dependent, field-independent, and field-mixed cognitive styles and problem-focused and emotion-focused problem-solving styles in navigating the Web to find either factual or topical information.

Knupfer, N.N.; Barrett, D.; and Lee, O. "A Collaborative Multimedia Development Project for Rural Training." In *Proceedings of the 17th Annual National Convention of the Association for Educational Communications and Technology*, edited by M.R. Simonson and M.L. Anderson. Washington, DC: AECT, 1995. (ED 383 315)
Multimedia enable different paths to be followed in processing information; pathways are selected according to the skills and preferences of the user. Implications for the design of multi/hypermedia resulted from a study of social worker training via distance education.

Koenemann, J. "Dynamic Information Seeking Strategies in Electronic Worlds." Position paper for the CHI 97 Workshop on Navigation in Electronic Worlds, Atlanta, GA, March 1997. <simon.cs.vt.edu/~koeneman/CHI97_Navigation.htm>
Users adopt a range of navigational and information-seeking strategies during a single search task. Systems that focus on one uniform means (e.g., searching or browsing) may not support this behavior.

Kussrow, P.G. "From Pedagogy through Andragogy to Holosagogy." 1997. (ED 412 213)
Defines holosagogy as a new system of learning and teaching that is based on how the brain processes information and that can accommodate different learning modalities, styles, and intelligences in a culturally diverse, information-based society.

Leader, L.F., and Klein, J.D. "The Effects of Search Tool and Cognitive Style on Performance in Hypermedia Database Searches." In *Proceedings of the 16th National Convention of the Association for Educational Communications and Technology*, edited by M.R. Simonson et al. Washington, DC: AECT, 1994. (ED 373 729)
Suggests that performance differences on an information retrieval task of field-dependent and field-independent subjects using different types of hypermedia search tools (browser, index/find, map) may derive from the cognitive style differences.

Liu, M., and Reed, W. M. "The Relationship between the Learning Strategies and Learning Styles in a Hypermedia Environment." In *Proceedings of the 16th National Convention of the Association for Educational Communications and Technology*, edited by M.R. Simonson et al. Washington, DC: AECT, 1994. (ED 372 727)
Use of a hypermedia language-learning environment by nonnative speakers of English revealed differences in approach to the system by field dependent and field independent users. Ways to match hypermedia type to learning style were identified.

Melara, G. E. "Investigating Learning Styles on Different Hypertext Environments." *Journal of Educational Computing Research* 14, no. 4 (1996): 313-328.
Hypertext with network structures accommodated learning styles better than hierarchical structures. Both structures equally accommodated users who preferred observation and those who preferred experimentation.

Ogozalek, V.Z.; Bush, C.; Hayeck, E.; and Lockwood, J. "Introducing Elderly College Students to Multimedia: An Intergenerational Approach." In *Recreating the Revolution. Proceedings of the 15th Annual National Educational Computing Conference*, edited by D. Ingham. Eugene, OR: International Society for Technology in Education, 1994. (ED 396 685)
Computer science students organized a multimedia workshop to give older adult classmates hands-on experience. Design implications for older adults using computers resulted from the findings.

Small, R.V., and Ferreira, S.M. "Multimedia vs. Print Information Resources: Information Location and Use, Motivation, and Learning Patterns for Children and Adults." In *Proceedings of the 16th National Convention of the Association for Educational Communications and Technology*, edited by M.R. Simonson et al. Washington, DC: AECT, 1994. (ED 373 763)
Identified differences in engagement of text and nontext information, expectation of success, and type of knowledge representation between adults and children and between users of multimedia and print information.

Swanson, L.J. "Learning Styles: A Review of the Literature." July 1995 (ED 387 067)
Explores the various definitions of learning styles; different theories (information processing, personality, and social interaction models) and learning style research among diverse groups. Finds that learning styles may follow cultural patterns.

Developed with funding from the Office of Educational Research and Improvement, U.S. Department of Education, under Contract No. RR93002001. Opinions expressed do not necessarily reflect the position or policies of OERI or the Department. *Trends and Issues Alerts* may be freely reproduced.

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ERIC Clearinghouse on Adult, Career, and Vocational Education

by Judith O. Wagner

PRACTICE APPLICATION 1999
BRIEF NO. 1

Using the Internet in Career Education

If job seekers or career counselors choose not to participate in using the Internet as a key tool in career development, they may be cheating themselves and their clients. (Henshaw 1997, p. 4)

The World Wide Web has a plethora of information that counselors and teachers can use about career planning, individual jobs, and searching for a job. This *Brief* includes information on identifying, evaluating, selecting, and using the Internet in the career education classroom.

Identifying Websites

Search engines and publications will lead you to myriad sources of information on career education. Once sites have been identified, they can be bookmarked for future reference. Because websites often disappear or change their address, it is important to search the World Wide Web at intervals to make sure your information is current.

Search engines and Web indexes offer a variety of features. Indexes such as Yahoo! <www.yahoo.com/> and Magellan <www.mckinley.com> are organized and evaluated and are like familiar library tools. Engines such as AltaVista™ <altavista.digital.com/> and HotBot <www.hotbot.com/> search words or phrases; some have advanced features that allow for more precise retrieval of information. It is important to consult the "help" section of any search tool to learn about idiosyncracies and defaults (*Information Management* 1998).

The ERIC Clearinghouse on Adult, Career, and Vocational Education <ericacve.org/> has developed several publications that include information about websites, such as *Information Management* (1998) and Wagner (1999). Listservs such as VOCNET (vocnet@cmsa.berkeley.edu) have subscribers who are always willing to share their experiences and expertise and a request will bring a wealth of information.

Evaluating Websites

The criteria for evaluating websites are much the same as evaluating any instructional resource (Sowards 1997; Symonds 1998; Wilkinson, Bennett, and Oliver 1997):

- **Authority.** Who developed the website/document? Is the author/institution identified with name, address, credentials? Does it show the date it was updated?
- **Layout, design, and accessibility.** Is the site easy to use? Is it well organized? Does the user have control of options such as frames and text only? Is there a site map? Is there a subscription fee? Can the material from the site be downloaded in a reasonable amount of time?
- **Links.** Are links sufficiently identified? Are they arranged logically? Are they current? Are they reliable?
- **Content.** Is the content consistent with the purpose of the site? Is it appropriate for the Web as a medium? Is it appropriate for its intended audience? Is the content relevant? Is the methodology described and appropriate? Has the document been peer reviewed? Is there a bibliography? Are there obvious errors in content?
- **Information structure and design.** Does the website follow accepted instructional design standards (purpose, scope, interactivity, format)?

Selecting Websites

Websites that relate to career education and the job search abound on the Internet. The time has come when the Web is an essential tool for those looking for any type of job. Although no one website includes all the elements of a job search, there are several, known as the "big board," that can give beginners a start. These sites include the following (Wagner 1999):

America's Job Bank <www.ajb.dni.us/>. Announces thousands of job openings, links to state search engines, and connects job seekers to employer-maintained job listings.

CareerMosaic <www.careermosaic.com/>. Has information on available jobs, employers, resume writing, job fairs, a career resource center, the college connection, and an international gateway.

CareerPath <careerpath.com>. Combines help-wanted listings from 63 newspapers throughout the country.

E-Span's Job Options <www.joboptions.com/esp/plsql/espan_enter.espan_home>. Provides the capability to search for a job, post a resume, search for employer information, and subscribe to a job alert service.

The Monster Board <www.monster.com/> (formerly Online Career Center). Provides resources to manage careers, track job searches, store resumes and cover letters, and connect to a global careers community.

A Web search will lead you to hundreds of sites that cover all aspects of career development. In addition to those mentioned, there are websites related to employment agencies, job fairs, job matching services, newspapers, resume services, employment magazines and newsletters, and international employment (Wagner 1999). Career counselors can use these resources to advise their clients (Henshaw 1997).

Using the Internet

The Internet can be used in career education in a number of ways (Offer and Watts 1997):

- **Access to information.** The Internet offers an enormous amount of information and career counselors can provide a filtering, quality assurance service.
- **Direct access to computer-assisted guidance.** A full range of computer-assisted systems is available online.
- **Distance counseling.** E-mail and video conferencing provide a powerful medium for delivering distance guidance.
- **Group work.** E-mail and newsgroups offer opportunities for group counseling.
- **Access and outreach.** The Internet allows access to people in new ways and places such as their own homes and workplaces.

- **Recruitment, placement, and the job search.** The Internet offers postings of available jobs, application forms, electronic submission of resumes, and websites that teach job-seeking skills.

In preparing this *Brief*, a message was sent to VOCNET, a vocational education listserv, asking how people were using the Internet in career education. Responses included—

- Going to <www.newwork.com> to review major stories related to work and education and to link to other websites (R. Feller, Internet message, January 20, 1999)
- Purchasing the bridges online service <cx.bridges.com/> (C.M. Hoyt, Internet message, January 19, 1999)
- Conducting scavenger hunts for websites and information related to emergency medicine; having students who are job shadowing locate programs in pharmacy (K. Blondeau, Internet message, January 19, 1999)
- Using the state career information system that provides basic job search information and links to Internet job banks (N. Peterson, Internet message, January 19, 1999)
- Accessing BC WorkInfoNet <www.workinfonet.ca/cwn/english/main.html> and Worksearch <www.gc.worksearch.ca> in Canada (J. Pasquale, Internet message, January 22, 1999; S. Conger, Internet message January 27, 1999)
- Doing research for classes by students and teachers (C. McClain, Internet message, January 20, 1998)
- Teaching students how to conduct an online job search and communicating links and other information (V. Wise-Neely, Internet message, January 22, 1998)
- Searching ERIC and gleaning information from listservs and other resources (L. Olsen, Internet message, January 20, 1998)

Learning job search strategies ranks high with student so it is important that they keep up to date with the latest in job search technology. A business education or communications course is a good place to discuss preparing a scannable resume, preparing an online resume, using the Internet in employment communication, and conducting mock interviews (Andrews and Dyrud 1997).

Academic and professional programs as well as career services offices at many colleges and universities have developed websites that address the needs of clients who are just beginning their career development process. Organizations maintain listservs that include pertinent information about career and professional development issues. The advantage of listservs is that responses come from a widely divergent group of people (Stevens and Lundberg 1998).

The University of Pennsylvania Career Service's website <www.upenn.edu/CPPS/> includes information about career development activities as well as about employers and occupations. Professional association websites include links to a variety of career information that is relevant to counselors, students, and others seeking career information. Relevant sites include the National Association of Colleges and Employers/JobWeb <www.jobweb.org> and the National Occupational Information Coordinating Committee <www.noicc.gov>. Career counselors should be aware of the emerging technologies related to career planning and development and begin to use them with their clients. Counselors can help develop or improve Internet-based systems by working with an organization to develop career intervention services; collecting data related to career applications of the Internet; hosting a listserv or chat room; or becoming a critic/reviewer of Internet-based applications (Carson and Cartwright 1997).

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Henshaw, Jon. *The Internet: A Necessary Resource for Career Development.* Hermosa Beach, CA: American Association for Career Education, 1997. (ED 413 435)

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Offer, Marcus, and Watts, Tony. *The Internet and Careers Work. NICEC Briefing.* Cambridge, England: National Institute for Careers Education and Counselling, 1997. (ED 414 451)

Sowards, Steven W. "'Save the Time of the Surfer': Evaluating Web Sites for Users." *Library Hi Tech* 15, no. 3-4 (1997): 155-158. (EJ 557 244)

Stevens, Darryl T., and Lundberg, David J. "The Emergence of the Internet: Enhancing Career Counseling Education and Services." *Journal of Career Development* 24, no. 3 (Spring 1998): 195-208. (EJ 557 790)

Symonds, Ann K. "Sizing Up Sites: How to Judge What You Find on the Web. The Smart Web Primer Part 2." *School Library Journal* 43, no. 4 (April 1997): 22-25. (EJ 543 163)

Wagner, Judith O. *Career Planning on the Internet. Trends and Issues Alert No. 3.* Columbus: ERIC Clearinghouse on Adult, Career, and Vocational Education, Center on Education and Training for Employment, the Ohio State University, 1999. <ericacve.org/docs/tia00068.htm>

Wilkinson, Gene L.; Bennett, Lisa T.; and Oliver, Kevin M. "Evaluation Criteria and Indicators of Quality for Internet Resources." *Educational Technology* 37, no. 3 (May-June 1997): 52-58. (EJ 544 841)

This project has been funded at least in part with Federal funds from the U.S. Department of Education under Contract No. ED-99-CO-0013. The content of this publication does not necessarily reflect the views or policies of the U.S. Department of Education nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government. *Practice Application Briefs* may be freely reproduced and are available at <http://ericacve.org/fulltext.asp>.

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Enabling Equity

Internet usage will continue to expand as personal computers become cheaper and as network connectivity becomes faster. "Full-motion' video and CD quality audio will eventually become the norm for personal computers on the Internet, and with them the general use of desktop videoconferencing. Improvements in speech recognition and alternative input devices will probably be significant in making computers and the Internet more accessible to adults who cannot work effectively with on-screen text" (Cahoon 1998, p. 75).

Today, "over half of the full-time workers in the U. S. use computers regularly on their jobs . . . More than 35 percent of households own a computer" (Eastmond 1998, p. 33). However, it is also true that "over 60 percent of American households do not have a home computer, more than 75 percent do not have a modem, more than 80 percent are not actually online, and almost 100 percent do not hunt for jobs online. . . No matter the source, it is clear that only a limited portion of the population makes effective use of the Internet" (Holt 1998, p. 68).

Although economic differences in the population may create greater division between the "haves" and "have nots," geographic and cultural differences may become less significant. "'Unlike a traditional neighborhood that is defined by geographical proximity, today adults can be involved in multiple Internet communities, composed of 'students, experts, and learning facilitates from around the world' (Cook 1995, p. 36). These communities can be more democratic than traditional ones because "asynchronous online discussion gives all participants the ability to compose and contribute messages that are as lengthy as they please" (Eastmond 1998, p. 36).

Gender differences appear to have no influence on distance learning performance and acceptance, according to the results of several studies reported by Koch (1998). In fact, in a study of 16,500 distance learning students at Old Dominion University, women achieved higher grade point averages for the 1996-1997 academic year than did men. The study also reported no evidence that women dislike or are intimidated by distance education (ibid.).

Older adults are also defying the stereotype that age is a deterrent to technology use. "Approximately 15% (7.6 million) of the

estimated 50.6 million U. S. citizens who browse the Web are aged 50 and older (Lewis 1998), and 30% of older adults aged 55-75 own a computer (Adler 1996)" (Imel 1998a, p. 1). These statistics reflect a potential for the involvement of older adults in continued education and training; and, ultimately, participation in new postretirement careers.

The publications included on the following pages address additional equity issues, such as the changing demographics of distance learners, cultural sensitivity to guide instructors in developing web-related learning experiences, ethical considerations for Internet-based adult education, and implications for older adults involvement in lifelong learning.

Readings:

Holt, M. E. "Ethical Considerations in Internet-Based Adult Education." In *Adult Learning and the Internet. New Directions for Adult and Continuing Education, no. 78*, edited by B. Cahoon, pp. 63-69. Reprinted with permission. Copyright © 1998 Jossey-Bass, Inc., Publishers.

Alivisatos, D. "Cultural Sensitivity within the Learning Environment." *Communique* 13, no. 1 (September 1997): 5-7. Reprinted with permission.

Wallace, L. "Responding to Changing Learner Demographics." *Communique* 13, no. 1 (September 1997): 4-5. Reprinted with permission.

Imel, S. *Seniors in Cyberspace. Trends and Issues Alert.* (1998a)

Power, access, control, privacy, and equity are among the many ethical concerns that face those who teach or learn on the Internet. Despite proclamations of educational progress through technology, the potentials for harm cannot be ignored or underestimated.

Ethical Considerations in Internet-Based Adult Education

Margaret E. Holt

Adult educators, like everyone else in the teaching and learning enterprise, are well advised to weigh ethical issues attached to Internet technologies. Some problems may be unique to these systems and tools, yet most are simply familiar dilemmas exacerbated by qualities such as speed, access, ease of manipulation, and scope of dissemination. Concerns for privacy, access, and intellectual property rights, for example, are hardly unique to the Internet, but risks may be magnified by the power and reach of electronic systems. As Resnick comments, "The sad fact is that the problems of the real world have penetrated the Internet" (quoted in Weber, 1997, p. R29). The technology genie is out of the bottle, and there's no stuffing it back inside.

Until recently, monitors in the halls of higher education appeared to detect little change in the way learning was to be delivered to students. Ample chalk, theater seating, and a lecture in hand seemed sufficient. Environmental scanners did not initially detect the technological transformation that was coming, while others expressed skepticism (not without some justification) that educational institutions could move swiftly enough to keep pace. In 1993, Landow observed, "It took only twenty-five years for the overhead projector to make it from the bowling alley to the classroom. I'm optimistic about academic computing; I've begun to see computers in bowling alleys" (p. 161).

But the technological changes brought about by the Internet will not slouch along over a quarter of a century. Whirlwind infiltration of hardware and software tools is already creating a turbulent environment in all of education. Technophiles and Luddites speak such different dialects that at best there is a failure to communicate and at worst dysfunction and hostility. These divisions are occurring within individuals as well as between them. Already

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specialties in psychiatry are emerging to diagnose and treat technology addicts. Describing his own "Internet addiction," Dillea (1995) contends, "Nothing can help the recovering modemaholic like F2F (face-to-face) meetings, where experiences like mine can be related. . . . Such meetings don't exist yet but I'm convinced the time is near when a 12-step virtual community will help countless others like me living one day at a time—off-line" (p. 12).

Certain ethical problems associated with Internet technology concern psychological well-being, while other risks are societal. E-mail, for example, while touted for its ease in disseminating ideas, allows both good and bad information to be transmitted with equal speed. The same technology that might help us to be more democratic, equitable, inclusive, and safe can just as easily facilitate incivility, offensive and violent speech, and widely disseminated declarations of hate toward individuals or groups (Raney, 1998). Orlikowski and Hoffman (1997) note that the deployment of e-mail typically produces unintended, emergent consequences in organizations: "An example of an anticipated change is the implementation of e-mail software that accomplishes its intended aim to facilitate increased, quicker communication among organizational members. An example of an emergent change is the use of the e-mail network as an informal grapevine disseminating rumors throughout an organization. The use of e-mail is typically not planned or anticipated when the network is implemented but often emerges tacitly over time in particular organizational contexts" (pp. 12–13).

Today, educational organizations are being transformed by the intended and unintended effects of technology. Even as its ubiquity begins to render it invisible, Internet technology demands continuous ethical and moral reflection (Reed and Sork, 1990). In a series of influential critiques, Postman (1985, 1992) has warned that we may be "amused to death" or mentally numbed if we fail to recognize and reflect upon the capacity of a "technopoly." Olcott (1997) observes "Mass deployment of technology in all spheres of human endeavor affects the lives of many. The crucial questions, however, cannot be answered if they are not being asked. We educators (particularly those who control technology) have a responsibility to reflect upon the ethical and moral issues around technology. We are a voice for successive generations, for teaching and learning, and for promoting public discourse about the relative merits of technology in education and society. Mr. Orwell would certainly agree with this assertion and would echo, that 'just because we can, doesn't mean we should' is a good place to begin anew."

Olcott also warns us to be aware of a false sense of progress with technology. He contends, 'the two words, progress and technology, are not always synonyms . . . We must pause long enough to step out of the technological maze and define the social boundaries of technology in education, society, and our lives rather than creating a culture permeated by what I call 'techapathy.'"

Clearly, scholarship and research are transformed by the ability to search and access tremendous quantities of on-line text and data. However, students may not be skilled in checking the accuracy or authenticity of the information

they discover. Misinformation on the Internet includes incomplete information, pranks, contradictions, out-of-date information, improperly translated data, unauthorized revisions, factual errors, biased information, and scholarly misconduct (Fitzgerald, 1996). Cut-and-paste editing makes it easier for those less ethically inclined to take information out of context and manipulate other people's work. Links to or attributions of original sources are frequently deleted or omitted by Internet plagiarists. Creative individuals enjoy the access, freedom, and flexibility to easily alter many forms of audiovisual material.

Anonymity, privacy, and confidentiality are at the forefront of ethical and legal deliberations about the Internet. Only a few scholars have attempted to examine the new meanings of human subjects requirements for research when those subjects are participants in electronic forums and conversations (Schrum and Harris, 1996). As yet, standards or norms for transmitting data electronically, securing privacy, or publishing works in repositories are scarce. Is electronic speech public or private? How is it protected? Who owns the data? An adult education student in a 1996 seminar at the University of Georgia expressed these convictions about ownership on-line (cited here with her permission):

> The written word is owned by the writer and with that ownership comes responsibility. Writers are responsible for the putting forth defensible ideas, for instance. On the other hand, the readers of the written word bring expectations. We expect that the words we read represent commitment on the part of the writer. We never naturally assume tentativeness on a writer's part even though this may be a reality. We expect the written words to fall together cohesively and coherently and to reflect the best thinking of the writer at the time. We even expect the words to endure over time. After all, since the words on the page have permanence we bring tacit expectations that the ideas beneath the words have permanence as well. The responsibilities and expectations that accompany writing place pressure on the writer. It is this pressure that discourages me from participating in a virtual community. If I am not ready to assume the responsibility because my ideas are not, in fact, well-developed enough for public sharing, then I am reluctant to send my words into Cyberspace for all to read and judge.

A related example of the ambivalence of students toward Internet-based instruction was offered by a professor on the ALNTALK on-line conference hosted by Vanderbilt University:

> I had an interesting situation while teaching with FirstClass conferencing in a graduate education course last year. I logged on at 11:30 one night and checked to see who else was online. One of my students was so I invited her for a 'chat.' She told me she was having problems with some homework so I helped her online for about 30 minutes. I was very pleased with this experience but then later found out that she was worried that I could monitor her at any time that I wanted. She thought I could actually read what she was writing while she wrote

> it in her own home on her home computer. I really took this as a message to inform my students more about what I could not do as the instructor using the technology [Bullock, 1997].

These comments illustrate not only the ethical consideration of ownership of ideas, but also that of individual freedom to choose to participate in Internet-based educational activities. The instructor who believes that she has a responsibility to assure her students are competent in the use of information technology faces a dilemma. Is it fair to require students to use technological tools when no clear consensus of opinion exists on the effectiveness or value of the learning resulting from such use? As Gilbert (1996) observes, "Unfortunately, there is no clear, irrefutable quantitative evidence of the superiority of education uses of information technology, and if information technology were certain to provide a simple solution to the 'education problem' it would already have been reported in every news medium." He adds that it is too soon for generalizations about the effectiveness of this mode of learning, nor is much known about the relationship between these types of learning modes and learning styles and motivations.

Another longtime ethical problem in academe that has been given new intensity by the Internet is academic honesty. Does the ready availability of searchable information increase the probability that students will steal the intellectual work of others and present it as their own? Innumerable Internet sites offer research papers for sale. Those tempted to plagiarize need only elementary surfing skills to find sites named "School sucks," "Cheater.com," "Term Paper Warehouse," "Essays for Sale," and "Recycled Papers," to name but a few sources of other people's ideas on thousands of topics. Papers are available in multiple languages, and students can even request papers that are said to be consistent with their recorded performance levels. For example, a student can request an "A" paper or a "C" paper, to prevent instructors from suspecting plagiarism if the paper is found inconsistent with past performance.

In addition to sensitizing students to matters of accuracy and honesty when using the Internet, instructors must pay thoughtful attention to the new power relationships it defines. Winner (1995) comments, "To invent a new technology requires that (in some way or another) society also invents the kinds of people who will use it, older practices, relationships and ways of defining people's identities fall by the wayside; new practices, relationships and identities take root."

Despite concerns about mandatory participation in on-line conferencing, researchers at the University of Georgia and Ithaca College found that reflective thinking was advanced for most participants in on-line National Issues Forums (see Chapter Five in this volume). Evaluations of these forums reflect a great range in learner satisfaction with the experience. A number of the participants found the verbal requirements of the forums constructive in helping stretch their abilities to express ideas in writing, while others found the exclusive emphasis on writing limiting, as other indicators of viewpoints such as

body language and facial expressions were absent. With limited research available to assess the nature of reflective thinking, deliberation, and discourse in Internet-based adult education, what is a responsible and fair position for instructors to assume regarding mandatory use of such technology in learning activities? How can instructors assess and grade student performance in group learning activities on the Internet? Should they be graded?

If students are not required to use Internet resources, will they be passed over for better jobs when they graduate? Gilbert (1996) wrote that students will be jeopardized and in some cases noncompetitive for careers if they do not integrate technology into their learning. Without a doubt, there are increasing numbers of jobs for which people lacking technological skills need not apply.

Already, intentionally or not, technology adopters have demonstrated a power to include and exclude, to assimilate and to isolate. In a world where an uneven distribution of education resources continues to prevail, it is hardly surprising that access to the Internet is also unevenly distributed. Demographic studies indicate that, compared to the general population, a disproportionately large number of active Internet users have college degrees, suggesting that access tends to break down along the lines of prior educational and economic success (Hoffman, Kalsbeek, and Novak, 1996). In a talk to a Teaching, Learning, and Technology Roundtable workshop, Reed Hundt, then chair of the Federal Communications Commission, labeled this dichotomous potential a "cutting wedge"—rather than the "cutting edge"—within society (Gilbert, 1996).

The haves-and-have-nots debate about Internet-based education is highly polarized. Some view the technology as a new means to include people who have traditionally been marginalized and oppressed, while others see such inclusion as a moot point as long as economic and structural factors go unaddressed. It seems clear that distance education technology can be used to facilitate hegemony if those in authority wish to maintain a segregation of learners by offering marginalized groups access to learning only via distance systems. Shaffer and Anundsen (1993) comment that to those who cannot access and use computers, those who can appear to be an elite, private group. Gilbert (1996) argues, "It is much too early to claim that offering only distance education options to any segment of society determined by rural location or lack of wealth can truly provide something like quality of educational opportunity."

The 1997 American Internet User Survey reports that "most users pay for their own access" (Miller and Clemente, 1997), raising the question of the extent to which economic barriers prevent people from becoming Internet users. According to Fortner (1995), excluding those who cannot afford information tools is one way to "excommunicate" individuals. He adds excess and choice as two other contributors to disconnection. Excess, or an overload of information that seems impossible to manage and muddle through, will deter some potential participants. Others, committed to voluntary simplicity, will make a considered decision not to invest themselves because they have determined that life in front of a computer is not something they need or want.

While not necessarily nostalgic, their "no thanks" attitude toward the Internet is similar to the way some people have opted not to complicate their lives with VCRs, microwave ovens, and cellular phones.

Statistics presented by Bolles in the 1997 *Job-Hunting on the Internet Guide* indicate that over 60 percent of American households do not have a home computer, more than 75 percent do not have a modem, more than 80 percent are not actually on-line, and almost 100 percent (99.93 percent) do not hunt for jobs on-line. The report goes on to state that 75 percent of Americans do not have access to the Internet at work or school, almost 80 percent never access the Internet, and only 8 percent "actually access the Internet regularly" (p. 4). While other sources present different numbers, and while Internet usage is a fast-moving and difficult-to-measure target, it is clear that for now only a limited portion of the population makes effective use of the Internet. Revisiting the issues posed by Fortner, the significant question is whether such limited access is a matter of choice or lack of possibility due to location or expense. Some students have greater access because they are wealthier, while others have greater access because they attend institutions that have committed more resources to these tools. Age is also a factor, according to Gilbert (1996): "The number of part-time and older students who have jobs is growing rapidly; but they are less likely to have these new technologies comfortably available for educational use at home or in their workplaces. They also have less time to use public access facilities on a campus."

Adult educators must be alert and attentive to the unavoidable ethical and legal issues surrounding Internet-based instruction. The exponential rate at which new hardware and software are introduced is likely to frustrate any attempts to standardize educational practices. Nonetheless, it is critical that the adult and continuing education field continue to be identified as a discipline that respects the dignity of persons by promoting and observing standards of ethical behavior.

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Cultural Sensitivity within the Learning Environment

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Reprinted with permission from **Communiqué** (Canadian Association for Distance Education), vol. 13, number 1, September 1997, pp. 5-7.

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What does the Medicine Wheel, the Talking Circle, and the Dream Catcher have in common with adult education and adult educators? In my experience as an aboriginal student, an adult educator, and a researcher in the field of aboriginal adult education, the answer is clear. Cultural awareness of our indigenous people is the cornerstone for developing effective educational programs for aboriginal learners. The traditions and beliefs such as the Medicine Wheel, the Talking Circle, and the Dream Catcher are part of aboriginal culture. Thus, adult educators of aboriginal learners need to be aware that to gain a true understanding of the aboriginal learner, it must be understood through the eyes of the learner. The process of achieving insight into aboriginal culture and the aboriginal learner is developed over time. While I still have much to learn in this area, I would like to share with you some observations I have made on my educational journey.

Aboriginal learners like:

- Adult educators who are approachable and supportive, both academically and emotionally;
- Curriculum which reflects aboriginal content and perspective;
- Flexibility in assignment requirements; and
- Frequent opportunities for reflection before they respond to ideas presented in class.

Aboriginal learners do not like:

- Use of stereotypical language in the depiction of aboriginal people (i.e., "savages," "heathens," etc.);
- Feelings of isolation in the learning envisionment; and
- Evaluation which does not recognize cultural differences (need for observation and reflection).

I use the following three guidelines to ensure a warm, culturally friendly learning environment.

Support

- Have an open door policy. Schedule times when students may drop by without the requirement of having to pre-arrange an appointment.
- Interact with the students both on an academic and personal level. Don't focus discussions exclusively around course content.
- Brainstorm with the students about ways that each one may fulfill assignment requirements and their desire for the assignment to reflect an aboriginal perspective.

Cultural Awareness

- Take the first step in cultural awareness by researching aboriginal history and the current issues facing aboriginal people.
- Invite students, elders, or community members to share aspects of their traditions and beliefs.
- Be inquisitive. Ask questions if you are unsure of what is culturally appropriate or acceptable. Ask the students for suggestions about ways courses may better reflect their needs.

Community Spirit

- Provide plenty of opportunities to interact with each other. In-class group work is an ideal vehicle to enable students to help each other academically, as well as to get to know each other on a personal level.
- Use the first 15 minutes of class time to invite students to share interesting events that may have occurred during the week.
- Encourage the formation of study groups. Give students, with their permissions, the list of class names and phone numbers.

At first glance, you might assume that guidelines for aboriginal learners are no different from guidelines for the effective facilitation of all adult learners. But despite six years of content with aboriginal adult learners in my current position of adult educator at the Micmac-Maliseet Institute at UNB, I find that one of my biggest challenges lies in outlining the differences between aboriginal adult learners and other adult learners. I agree that the guidelines are, in themselves, generic for adult learning facilitation, but when I come to apply them to the uniqueness of the North American aboriginal heritage and culture, the learning environment takes on an identity that reflects this uniqueness. Here are some examples:

(i) The opening ceremony for special classes and public events is a ceremony to acknowledge and thank the Creator for enabling everyone to gather as a class or group and for creating our culture and identity. "We are just guests on this earth, so we respect our ancestors for preserving the land, and the Creator who gave us the gift of allowing us to walk on this earth for a while before we return to the spiritual world."

(ii) Ensure that the scope of thinking needed for assignments fits with aboriginal values. One professor I know made the mistake of splitting course written work for grading into two pieces—one analyzing in depth an educational problem, and the other (later) proposing and justifying several solutions. The aboriginal student in the class was totally bemused about such an approach and could not cope: "How could you stop at the problem? That doesn't help my community!"

Learning to see the world (and the classroom) through aboriginal eyes is a key task for educators. When we see that uniqueness, we'll be able to meet the request of one aboriginal learner who states: "I don't want to be treated differently. I just want my differences to be recognized."

Responding to Changing Learner Demographics

Lori Wallace

Reprinted with permission from *Communiqué* vol. 13, numbers 3-4, May 1998, pp.4-5

Recent research (Guernsey 1998; Wallace 1996) suggests that there is a trend away from the type of learner typically presented in the distance education literature: that of the adult learner who studies part-time, works full-time, and fulfills additional roles as a parent and community volunteer. The majority of learners in degree-credit distance education courses now appear to be a demographic subset of the on-campus student body in that they are typically under the age of 26 years, enrolled in an average of three full courses, mid-way through their degree programs, and are urban dwellers who combine distance education courses with on-campus study. These students are typically single with no dependents, are not engaged in volunteer work, and are employed an average of 20 hours per week in service or clerical employment.

While the generalizability of this demographic trend needs to be more firmly established (in university degree-credit and continuing education programs and beyond), it would also seem prudent that we begin to explore its implications. How might these changes in learner demographics affect the ways in which we develop, market, and deliver courses; the types of learner support we put in place; the technologies we use; and our relationships with other faculties and units on our campuses?

The trend described above suggests that we are encountering two major changes:

(1) Instead of serving one relatively homogeneous population of adult learners who are often geographically distant, our student population now consists of two quite different groups; and

(2) We are now serving increasing numbers of younger on-campus students who do not conform to our traditional assumptions about distance education learners.

Each of these changes presents new challenges and new questions that distance education practitioners may need to ask in order to begin adapting to these changes. The following discussion deals with both of these changes as well as with the institutional implications presented by them.

Implications of serving a more diverse learner population

Just as increased diversity complicates and enriches the face-to-face classroom, the new heterogeneity in distance education learners requires adequate information, experience, and planning in order for virtual classes to function effectively. Questions that we might explore include:

- Are changes needed in instructional design with respect to presentation, pacing, interaction, learning activities, and evaluation to accommodate the increasing diversity of learners?
- What unexpected new wrinkles are introduced by the participation in distance education by a younger on-campus cohort of learners? For example, findings of my research in progress

suggest that younger learners are much more likely than adult learners to enroll in distance education courses for the purpose of improving their grades. Does this motivation introduce an element of competitiveness that makes adult learners less comfortable? Does it increase the potential incidence of academic dishonesty? If so, will the immediacy or completeness of feedback that is part of our current model be restricted by gate-keeping concerns?

- Which technologies would best meet the flexibility in time, place, and pace of study that a wide range of working students requires? For example, the increasingly accessible and powerful capabilities of the Internet and World Wide Web (WWW) appear to offer solutions to many of the difficulties presented by an increasingly heterogeneous student population, but our knowledge base with respect to how learning should be structured using such technologies is still limited.
- What are the differences in students' access to, and experience with, technologies such as the World Wide Web? Which students will most benefit?

Implications of serving a new learner population

The population previously served by university distance education was, notwithstanding the wide diversity of needs within it, demographically homogeneous (i.e., adult, part-time, and at a geographic distance). Courses were developed and delivered using an adult education model, and attended to adult motivations, life transitions, interests, and commitments. Distance education practitioners drew much of their professional expertise from adult education, and have a long standing identification with the adult education field.

Now, while we continue to serve a declining proportion of these students, we also need to address the needs of another, growing student population: younger, urban on-campus learners. We know less than we would like about younger distance learners, particularly the extent that they might require different resources. We may need to expand the sources that we use to inform our practice, and look beyond the adult education field for knowledge about traditional undergraduate students. Questions we might ask are:

- To what extent are the development, motivation, learning styles, and skills of traditional university students similar/different to those of adult learners?
- What components of adult education theory are well suited to this new population? For example, to what extent would younger distance education students benefit from the adult education emphasis on constructed learning and self-directedness?
- What other sources of knowledge about younger learners are available? For example, to what extent is the research on teaching and learning in higher education applicable to our practice? How can we better tap into the store of on-campus teaching experience of our faculty members?
- Would younger, urban distance education students benefit from different learning supports than those we currently have in place?

- How does a large urban-based distance education student body affect delivery costs, and demand for on-campus services such as library, counselling, and tutorials?

Implications for changing institutional relationships

The usual placement of distance education programs within continuing education units is an artifact of our mutual association with "extension" programming. Such activities have been considered marginal to the central mission of the university because they involved extending university access to *non-traditional* students. Now, distance education populations appear to be converging with traditional on-campus populations, but this is not the result of a planned or coordinated institutional effort.

The number of students who must combine employment with study is likely to continue to grow, as is interest in the use of technology for teaching and learning. Meanwhile, university resources are likely to continue to shrink. Distance education practitioners do not need any convincing that these factors indicate that distance education is going to play a larger role in university programming. What is unclear is the nature of that role. We now share students with many faculties — what other systemic changes will accompany convergence? For example, what changes are on the horizon with respect to inter-institutional agreements, post-secondary infrastructure, budget allocation and income distribution, the use of faculty teaching resources, organizational culture, and roles for distance educators? The marginal status of many distance education units increases the risk that we may not be as central to the institutional planning process as we might wish. How can we ensure that we are active participants in these institutional changes? Where might distance education units best be placed?

Conclusion

Many distance education units have spent the past decade "dancing as fast we can" to maintain quality of programming and student support as well as to maintain currency with research and technology — all with fewer resources. One of the costs of these pressures may be that we risk missing important changes in our students' needs, and waste or misdirect resources. In order to minimize this risk, we need to take immediate advantage of formal and informal opportunities to share impressions, information, and strategies.

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Seniors in Cyberspace

Many older adults are defying the stereotype that computers are for the young and are actively engaged in using the Internet as both consumers and producers of information (Imel 1997). Approximately 15% (7.6 million) of the estimated 50.6 million U.S. citizens who browse the web are aged 50 and older (Lewis 1998), and 30% of older adults aged 55-75 own a computer (Adler 1996). These figures represent the intersection of two trends: the aging of the population in the United States with an extended period of active adulthood and the growth of the information society with unparalleled opportunities for connecting online (Furlong 1997; Timmerman 1998). This *Alert* highlights some of the trends and issues related to the increased use of the Internet by older adults, including some implications for adult and continuing educators. Lists of print and online resources are included.

A desire to gain access to cyberspace is one of the primary reasons older adults adopt new information technologies (Furlong 1997). Although many older adults initially log on to the Internet as a means of connecting with friends and family, they quickly learn that it is also a valuable source of information on financial, health, travel and other topics of interest to them. In addition, through discussion groups and "chat rooms," they link with individuals who share similar interests (Flynn 1996; Furlong 1997; Lewis 1998). The Internet also erases the impact of many physical disabilities (Furlong 1997; LeClaire 1997). According to Hugh O'Connor, director of the AARP Research Information Center, "the Internet can stimulate independent living among the elderly . . . . help combat isolation, spur lifelong learning, create opportunities for volunteering and make it easier for retirees to earn extra income without leaving home" (Lewis 1998, pp. 1, 14).

Among older adults, both computer ownership and online participation are tied to level of education and to socioeconomic status: 50% of those over age 50 who use the Internet have college degrees and almost one-third have incomes exceeding $70,000. Older women, however, are less likely than their male counterparts to own computers and to go online (Adler 1996; Timmerman 1998).

Older adults have used a variety of methods to learn how to use the computer. Nearly 40% taught themselves, whereas just over 20% learned at work. Women are much more likely than men to have taken a class or learned from a friend. Those who consider themselves to be novice computer users are much more likely to have taken a class than those who consider themselves to be experienced. "Experienced" users tend to be those who have taught themselves or learned at work (Adler 1996). Timmerman (1998) speculates that older adults who were early adopters of computer technology and, as a result, consider themselves experienced, are likely to be self-directed, lifelong learners; thus teaching themselves is a preferred method of learning.

When combined with Internet access, learning to use computer technology can provide older adults opportunities for lifelong learning and continuing growth and development and also help offset social isolation and loneliness (Furlong 1997; Galusha [1997]). Adult and continuing educators who wish to support older adult learners in learning to use computer technology should consider the following. Although a strong demand for computer instruction exists among older adults, facilities and equipment on which to provide training are often lacking (Galusha [1997]; Timmerman 1998). Some providers have overcome this barrier by entering into agreements with hardware and software manufacturers who agree to contribute equipment for training purposes (Timmerman 1998). Course development is another area that must be considered. Timmerman recommends the use of peer instructors who understand how adults learn and teaching methodologies that are nonthreatening and self-paced. Finally, adult and continuing educators need to be aware of issues of access and equity. The statistics on which older adults currently access the Internet closely mirror participation statistics for adult and continuing education. Adult and continuing education programs have tended to attract the most highly educated and affluent groups in the population. Adult educators need to develop training programs that will encourage groups of older adults who are not currently accessing the Internet to become full participants in the information age (ibid.).

Print Resources

Adler R. P. "Older Adults and Computers: Report of a National Survey." San Francisco, CA: SeniorNet, 1996. <http://www.seniornet.org/intutc/survey2.html>

A survey was conducted by SeniorNet to assess attitudes and computer usage patterns among senior computer owners and to explore the level of familiarity with and interest in computers among nonowners. Survey results reveal that more and more older adults are becoming computer users.

Baldi, R. A. "Training Older Adults to Use the Computer: Issues Related to the Workplace, Attitudes, and Training." *Educational Gerontology* 23, no. 5 (July-August 1997): 453-465.

After reviewing research that refutes negative perspectives about older adults' willingness and ability to acquire computer literacy, this article examines issues related to training older adults in the use of computers. Training to facilitate learning of computer skills by older adults should consider factors related to equipment, information, tasks, and individuals.

Callum, M. "Taming Your Computer." *New Choices: Living Even Better after 50* 36, no. 9 (November 1996): 68-73.

Discusses how older adults can use the new computer technology, including e-mail and CD-ROM, to uncover new worlds of interest and new communities of friends. Ten World Wide Web sites are highlighted.

Dixon, J. M. *Predicting Seniors' Use of Cyberspace.* New York: Garland, 1997.

Reports on a study of adults aged 55 and over who use SeniorNet. The study was designed to examine whether a needs gratification model could explain participants' social networking behaviors and to explain the frequency of their participation

Finn, J., ed. "Aging and Information Technology. Special Issue." *Generations* 21, no. 3 (Fall 1997): 4-70

The focus of this issue is on how computers and the Internet are changing the delivery of services and care not only for older people but also for their families and professionals in the field of aging. Topics include health, spirituality, community building, confidentiality and security, distance learning in gerontology, and Internet resources on aging.

Flynn, M. K. "Plugged in Seniors." *U.S. News and World Report,* June 10, 1996. <http://www.usnews. om/usnews/issue/ srnet.htm>

Describes how older people are using the Internet. Includes information on SeniorNet and lists some popular Internet sites for older adults.

Furlong, M. "Creating Online Community for Older Adults." *Generations* 21, no. 3 (Fall 1997): 33-35.

Discusses the role of learning communities in the changing world of information and highlights some "virtual places" that can provide older adults with services that can enhance their lives. Notes that gaining access to the Internet is one important reason that older adults use computers.

Galusha, J. M. "The Use of Computer Technology by Older Adults." Unpublished paper. Hattiesburg: University of Southern Mississippi, [1997].

This literature review explores the characteristics of older adults who use personal computers. Included is information on ownership, use, reasons for nonownership, challenges, and the author's perspective on training older adults to use the computer.

Imel, S. *A New Look at Older Adults. Trends and Issues Alerts.* Columbus: ERIC Clearinghouse on Adult, Career, and Vocational Education, Center on Education and Training for Employment, College of Education, The Ohio State University, 1997. (ED 409 444). <http://coe.ohio-state.edu/cete/ericacve/docs/look-old.htm>

Three trends related to older adults are described: the amount and kind of learning in which they engage, advocacy of age-integrated programs and policies, and the amount of information about and for older adults available over the Internet. A bibliography of print resources and resource organizations is included.

Lawhon, T.; Ennis, D.; and Lawhon, D. C. "Senior Adults and Computers in the 1990s." *Educational Gerontology* 22, no. 2 (March 1996): 193-201.

Older adults can use computers to improve their productivity, entertain themselves, and enhance education and daily functions. Computer training helps them increase productivity, learn skills, and boost short-term memory. Electronic mail, online services, and the Internet encourage socialization. Adapted technology helps disabled and ill elders use computers.

LeClaire, R. B. "How a Computer and SeniorNet Changed My Life." *Generations* 21, no. 3 (Fall 1997): 36-37.

The author describes how her computer and membership in SeniorNet, an organization of older people using computers, changed her life. LeClaire, who is deaf, made many friends in this organization and was comforted by them during difficult times.

Lewis, R. "The Web: A New World Opens Up." *AARP Bulletin* 39, no. 2 (February 1998): 1, 14.

Discusses the variety of ways of older adults are using the Internet and examines its potential to "transform the experience of aging." A list of websites for federal government agencies, general information, and health and research material is included.

Redding, T. R.; Eisenman, G.; and Rugolo, J. "Training in Technology for Late Adopters: Learning in Retirement, Computers for Seniors." Unpublished paper, March 1998.

This paper presents a curriculum designed to teach computer technology through the Learning in Retirement Institute (LRI), a national program of peer-led continuing education programs for adults of retirement age. The authors suggest ways of removing learning barriers and improving the success rate for teaching technology to late adopters, those who wait to learn about and use computers but who ultimately adjust to the change and who are most likely to participate in LRI programs.

Timmerman, S. "The Role of Information Technology in Older Adult Learning." In *Learning: Meeting the Challenges of Older Adulthood. New Directions for Adult and Continuing Education,* no. 77, edited by J. C. Fisher and M. A. Wolf. San Francisco, CA: Jossey-Bass, 1998.

Discusses how older adult learners are using information technology and describes SeniorNet's Learning Centers and Microsoft/ AARP Community Technology Seminars. Future trends and issues highlighted include the failure of large numbers of older adults to engage in traditional distance learning, the production costs associated with the development of online and multimedia courses, and access of older adults with disabilities.

Internet Resources

American Association of Retired Persons <http://www.aarp.org>. Contains background on aging issues, reports on membership benefits, provides information about volunteer opportunities and local activities as well as links to other sites of interest to older adults.

Senior World Online <http://www.seniorworld.com/>. This online publication is organized by geographic region, with each regional area containing stories of regional as well as national interest.

Seniors Computer Information Project <http://www.mbnet.mb.ca/crm/>. A project of Creative Retirement Manitoba, this site features content in four main areas: specific categories (advocacy, health, lifestyle, finance, special needs, etc.), Café (discussion groups, Cyberpals, etc.), Canadian Geography, and selected sites of interest.

SeniorNet <http://www.Seniornet.org/>. Includes Internet roundtables, e-mail pen pals, and information on Internet learning centers for seniors.

Seniors Online Blacksburg, VA <http://www.bev.net/community/seniors/>. In addition to full-text information related to local events, this site has sections on Internet help information sites, senior related sites on the web, and government, Internet, and financial resources for seniors.

Toledo-Lucas County Public Library Links for Older Adults <http://www.library.toledo.oh.us/adultlinks.htm#computers>. Provides links in the following areas: aging, computers, finance, genealogy, health, and travel.

Developed with funding from the Office of Educational Research and Improvement, U.S. Department of Education, under Contract No. RR93002001. Opinions expressed do not necessarily reflect the position or policies of OERI or the Department. *Trends and Issues Alerts* may be freely reproduced.

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Technology as a Strategy for Development

Most recommendations for the improvement of teaching and learning through telecommunications networks address the need for more interaction among students and their teachers.

> Learning at a distance can be both isolating and highly interactive, and electronic connectedness is a different kind of interaction than what takes place in traditional classrooms . . . Because humans are involved, social norms do develop in cyberspace, but they require new communications competencies (Eastmond 1995). Online courses often feature consensus building and group projects, through which learners can develop skills in collaborating with distance colleagues and cooperating with diverse individuals. Such skills are increasingly needed in the global workplace (Dede 1996). (Kerka 1996, p. 2)

Humans are social beings, and, as posited by the constructivist theory of learning, they develop new understandings and knowledge through their social interactions with a community of others, which some call "communities of practice." Collaboration, critical analysis, and authentic assessments facilitated by technology are some of the strategies through which instructors can empower students in their knowledge and skill development.

Interacting Collaboratively

The Internet and World Wide Web serve to bring learners together in the same space so that they can share their knowledge and insights, communicating with each other to help each other learn (Kerka 1996). Online discussions, conferencing exchanges, and collaborative projects are examples of technology-based interactive activities that support the social construction of knowledge. E-mail exchanges and online discussions offer opportunities for the most basic levels of communication among Internet users as these types of exchanges are asynchronous—not involving participants in conversation during the same time frame.

The next level of Internet communication is characterized by more reflection and interaction among technology users. Participation in these activities requires students to read and consider the perspectives of other learners, reflect upon those insights, and adjust and readjust their thinking based on the information at hand. Virtual courses may elevate interaction to a deeper level because they require online group discussions and collaboration among learners, bringing them together for the purpose of "creating an assignment or performing a task in which the joint outcome is more complex than it could have been if done individually" (Eastmond 1998, p. 35). Chandersekaran (1998) predicts that "training materials will be transformed into multimedia documents capable of integrating video, audio broadcast, three-dimensional graphics, and animation with Internet technologies to make learning more interactive for the participants and more challenging for the content creator" (p. 1). Virtual reality learning environments are one example of interactive technology applications that inspire collaboration.

Virtual reality, a computer-generated sensory learning environment, promotes collaboration by engaging learners in simulated environments that replicate real-world experiences without the drawbacks of danger, inaccessibility, and so forth. These environments are highly motivational because they require active participation and on-screen interaction. One of the features of virtual reality learning experiences is that they require the learner to interact with three-dimensional graphics and databases. As such, they require the provision of multiple interactions, tools for interaction and exploration, and teacher ability to communicate with learners in the virtual environment (Kim 1997).

A discussion of collaborative tools and their role in the provision of web-based learning programs is provided in the following publication by Patel and Volk (1997).

Reading:

Patel, M. D., and Volk, E. T. "Designing for the Web: Integrated Independent and Collaborative Learning on the Internet." In *Competition-Connection-Collaboration. Proceedings, 13th Annual Conference in Distance Teaching and Learning*, pp. 239-245. Madison: University of Wisconsin, 1997. Reprinted with permission.

Designing for the Web: Integrated Independent and Collaborative Learning on the Internet

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Abstract

Advances in Internet technologies promise to revolutionize the concept of distance learning. Until recently, Internet-based education and training consisted of stand alone independent and collaborative tools which allowed limited interactivity with both courseware and other students. During the past six months, the ability to create interactive multimedia courseware and database applications for real-time delivery via the World Wide Web, along with improvements in collaborative tools have sparked the evolution from individual Internet-based training courses to integrated Web-based learning *programs*. Today's vision of an on-line learning program combines these new or improved capabilities, providing modern organizations with the ability to deliver just-in-time learning customized to each student's needs based on criteria such as job title, level of experience, and prior training.

Traditional analysis and design considerations associated with Web-based courseware still apply to integrated on-line training programs, but two additional factors must be considered. First, developers must assess the suitability of and need for different delivery techniques (e.g. interactive multimedia courseware, instructor-led chat rooms, guided research and study, etc.). This process can be simplified by using a delivery strategy selection model to match training needs and delivery strategies. Once the appropriate strategies have been identified, techniques for integrating individual components of the on-line program must be determined. These components include independent and collaborative tools, as well as the database module for student records tracking and management, and overall site structure.

The Federal Acquisition Institute's OnLine University is a fully integrated and functional training program residing on the World Wide Web. This and similar programs demonstrate the evolution of Internet-based training from stand alone courseware to fully integrated education and training programs.

Introduction

The creation and application of new tools and technologies has been an integral part of human evolution and history. From the first stone tool to the latest computer chip, the changes caused by our discoveries have revolutionized peoples' lives, as well as the

structure of organizations in which they function. During the past six months, the ability to create interactive multimedia courseware and database applications for real-time delivery via the World Wide Web, along with improvements in collaborative tools have sparked the evolution from individual Internet-based learning courses to integrated Web-based learning programs. Today's vision of an on-line learning program combines these new or improved capabilities, providing modern organizations with the ability to deliver just-in-time learning customized to each student's needs based on criteria such as area of expertise, level of experience, and prior training. This paper describes the components and capabilities of an *integrated on-line learning program*, and the individual and organizational benefits associated with such a program.

Distance Learning: A Historical Perspective

Education and training is usually pictured in a classroom-style setting. This technique is still commonly used, but with the increased demands on time and financial resources produced by today's academic and professional environments, fewer individuals and organizations can afford the luxury of this setting. Because of these demands and with the advent of new or improved technologies, many professional and academic organizations have turned to a method of education and training known as *distance learning*.

Until the early 1980s, traditional distance learning consisted primarily of printed materials delivered to students in the form of correspondence courses. Other technologies have entered the distance learning arena in recent years, but the invention of the World Wide Web (WWW) has and will continue to revolutionize the very nature of distance learning. The Web's flexibility brings together all of the capabilities of existing distance learning media (print, video, computer based training, satellite delivered training, etc.) in one centralized "location." It also allows for the use of many capabilities that were previously unavailable in the field of distance learning. The combination of these previously independent and new capabilities is what gives us the functionality of a modern on-line learning program.

Tools for Web-Based Learning

Today's distance learning student can experience independent, self-paced as well as collaborative learning using a variety of Web-based tools. Collaborative tools allow students to communicate with each other and/or with the instructor. These tools fall into two categories: synchronous and asynchronous. Synchronous collaboration occurs when the instructor and students(s) interact simultaneously, whereas asynchronous collaboration allows students to interact according to their own schedules. (Steiner, 1996, p. 1)

The Internet provides many opportunities for synchronous learning. The evolution of virtual environments such as Multi-user Dimensions (MUDs) and MUD, Object Oriented (MOO) has provided opportunities for individuals to collaborate in real time via the Internet since the early 1980s. In recent years, these environments have been superseded by the use of chatroom software.

Chatrooms provide one of the most important capabilities of a modern on-line learning program. Chatrooms can be used as a virtual classroom in which the students and instructor meet at regularly scheduled times. The instructor can screen student responses to the entire room, much like selecting a student to speak by having them raise their hand. Documents such as homework assignments can be sent and received in the form of electronic files. Electronic whiteboards can be used to draw notes and pictures, and the class can even take a "guided tour" by using a feature that allows the instructor to force students' browsers to go to and return from other URLs.

Asynchronous tools also provide critical functionality for the on-line student. The oldest form of asynchronous communication on the Internet is electronic mail, or e-mail. Though e-mail is a more mature technology, it can play an important role in an on-line learning program. Students can use e-mail or related systems such as bulletin boards to collaborate with other students or to ask the instructor questions at any time of the day or night, and the other party can respond according to his or her own schedule.

Collaborative learning provides many opportunities for a distance learning program, but it does not provide the level of independent or interactive stimulus that is best suited to many topics. One example is the use of reference documents and information. An instructor can send required information to students using e-mail or other file transfer procedures, but this approach eliminates the opportunity for a student to learn or refine essential research skills critical to "real world" survival, and it limits the creativity and innovative thought process students might otherwise experience.

The WWW allows students to use a variety of independent tools. For example, Web links and searches can provide on-line learners with a multitude of information and opportunity to refine research skills. An organization can focus these efforts by creating a Web page with links to its own on-line library, or to relevant sites from other organizations.

The Web also provides students with the capability to use self-paced interactive multimedia courseware. Interactive courseware has been delivered via computer for several years, but until recently was difficult or impossible to access via the Internet. When possible, access consisted of files placed on the Internet which were usually too large to be easily downloaded. Within the past year, several computer based training authoring packages have made the leap to the Web by using technologies which convert existing courseware into manageable packets of data which can be "streamed" directly to a student's desktop. The student can view and interact with the courseware in real-time, all without a lengthy download process. Interactive courseware uses audio, animations and complex interactions to maximize learning. Students can actually see complex step-by-step procedures, then replicate them through interaction with the computer. Each student controls the pace at which he or she progresses through the materials, and can repeat some or all of the training without hindering other students' progress.

With recent improvements in collaborative tools along with the ability to deliver Web-based interactive courseware and other advances, the Web is emerging as a vehicle for

integrated learning programs. In order to effectively utilize Web and Internet technology, key design issues must be considered by instructional designers and developers.

Key Design Considerations for an On-line Learning Program

Student Recordkeeping and Courseware Management on the Web

The growth of the interactive multimedia or computer-based training (CBT) market resulted in a key capability required to develop an on-line learning program. This capability, commonly known as computer managed instruction (CMI), uses a relational database to establish a record for each student. The database can record a student's progress through the courseware, allowing the student to immediately return to where he or she left off, and even structure the courseware so that advanced lessons are only available when prerequisite lessons have been completed. It can be used to dynamically create a menu of lessons and other educational resources tailored to each student's specific needs. It does this by using demographic information entered by the student, such as field of study, job title, and company or agency.

The ability to use CMI on the World Wide Web does more than simply replicating the functionality of existing CBT. CMI on the Web is the most powerful aspect of a true on-line learning program. Web based CMI integrates all the independent and collaborative tools into one cohesive program. New students are sent to a URL where they must input demographic information. This information is processed by the CMI, which then produces a menu of lessons and other instructional activities required for successful completion of the program. This could be as simple as a series of lessons related to job skills, or as complex as a university degree program. As the student completes prerequisite independent and collaborative courses or lessons, they are granted access to the next series of instructional materials. The student can access his or her record at any time to check grades, conduct research in a virtual reference center or library, communicate with an advisor, or visit the virtual student center—all tailored to his or her needs.

The Web also provides an important new courseware management capability. A major disadvantage associated with other distance learning technologies is in determining if a student has the latest version of the courseware. Print based reference materials and text may change frequently due to technical advances. CBT is often updated to reflect the latest equipment and other technical or instructional changes. Many of these version control issues are eliminated through use of the Web. The most recent versions of reference materials and courseware are used to replace existing versions on the Web. Only one copy of the courseware resides on the Web, thus students and course providers alike can be certain that the correct courseware is being used.

Delivery Strategy

Like all distance learning programs, some sort of methodology must be applied to create an effective, efficient learning experience. Instructional Systems Design (ISD) methodology, also known as Systems Approach to Training, is a commonly applied

methodology among instructional designers. Once instructional objectives are identified, the most appropriate delivery technique is selected (i.e., print, video, CBT). Instructional designers then take this assessment a step further and identify delivery techniques specific to each objective or set of objectives. Many training programs therefore utilize a combination of instructional techniques best suited to the stated learning objectives.

An on-line learning program is unique in that it acts as the main vehicle for *all* types of delivery methods—traditional and non-traditional. Instructional designers therefore can consider the full range of independent and collaborative tools, and they are not limited in selection.

In conjunction with the selection of appropriate delivery media, a detailed technology assessment must be conducted to identify existing and required infrastructure. This assessment is critical to the success of an on-line learning program. It includes examination of the existing server and client workstation capabilities. The results of this analysis are critical in determining how best to implement an Internet based solution for an organization. The technology assessment must not be performed independent of the instructional analysis—the two are required for successful accomplishment of learning via the Web.

Site Structure and Integration

The next step in designing an on-line learning program is deciding how to integrate the different tools in a cohesive, organized, and easy to use fashion. An organized and logical site structure can result in effective training. Students need predictability and organization (Lynch, 1995). New and returning students should enter the program from the same Web page. The organization of this core page must be both familiar and logical from a student's perspective.

Using the inherent capabilities of the Web, this is best achieved by using a graphical metaphor to portray an already familiar environment. This might be an actual or modified map of an academic campus, or of an organization's training facility. The range of possibilities is limited only by the design team's imagination and the students' experiences.

However the design team implements the site structure, it is imperative that the site be mapped out in a cohesive, logical manner. With multiple learning tools and media integrated into a robust virtual "university" for learning, students must not be subjected to barriers for learning. Configuration management also plays a crucial role as version control is requisite for effective learning.

The Federal Acquisition Institute's OnLine University: A Model for Integrated Learning

The United States General Services Administration—Federal Acquisition Institute OnLine University, (1997) is an example of a fully integrated OnLine learning program. The FAI OnLine is currently being developed by Universal Systems Inc. using multiple

Internet technologies. While the focus is on Web-based training tools, USI is also integrating database technologies tailored for managing student records, courseware modules, and associated courseware learning "paths." The FAI OnLine is based on the metaphor of a university, providing students with typical services found on most campuses. While some university home pages provide information to students at any location, very few actually implement many of the on-line features inherent in the FAI OnLine. The FAI OnLine integrates collaborative and independent tools through multiple training programs, for procurement personnel of varying levels of experience throughout the Federal Government. The integration of these various tools in an on-line program provides a capability never before recognized in traditional or distance education and training, the ability to deliver virtually any type of instruction "just-in-time," or when it is most appropriate for each individual student.

Conclusion

In summary, an integrated on-line learning program provides the following advantages:

- ❖ Delivery of instructional information and lessons to a large, geographically diverse audience
- ❖ Standardized independent and collaborative tools combined in a flexible but cohesive program
- ❖ Access to and navigation through the program controlled by Web-based CMI
- ❖ Lessons and information tailored to each student's needs based on demographic information such as intended area of study, prior instruction received, job title/position, and department or agency

An integrated on-line learning program provides the first distance learning solution that effectively and efficiently meets all the instructional needs of an organization. By understanding and appropriately integrating the independent and collaborative capabilities and components of such a program, training designers and developers can create a solution that will dramatically change the concept of education and training within their organization and throughout the training community.

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Engaging in Critical Analysis

One constraint to online learning for the Internet user has to do with the accuracy, veracity, and reliability of online information. There are over 50 million website addresses indexed in powerful search engines such as HotBot and Excite and in metalevel document indexes such as Yahoo! (Berghel 1997). The documents located through these search engines have not been screened for completeness, accuracy, credibility, currency, content, interest, or audience. Many of them contain advertising trivia rather than substantive content. Additionally, just because websites are accessible on the Internet, this does not guarantee that they can be easily navigated or that they are anything more than vanity pages. This proliferation of Internet clutter has forced the information seeker into roles previously left to editors, experts, and professionals (Ryder and Wilson 1996).

"The supreme difficulty in the information age will be the ability to restrict a learner's education to a 'sanctioned' body of literature. The discipline required of learners in the postmodern age goes beyond that of all previous generations. The role of education in the age of information will be the development of disciplined readers, skilled in the art of abductive logic. Since we can no longer filter and select proper materials for our students, our highest calling as educators will be to support students in developing such discipline for themselves" (Ryder and Wilson 1996, p. 651).

"In the case of Internet sources, a useful strategy being increasingly employed by schools is to establish Home Pages for each curriculum area or year level. Specific websites are attached to these curriculum or year-level pages and students are required to restrict their searching to these sites. This practice is not only pragmatic, it also ensures equity of access" ("What Students Produce" 1996, p. 8).

Coping with this problem from an instructor/trainer point of view will require considerably more time, effort, and professional expertise. Professional development activities will be required to prepare instructors for their expanded role as evaluators of websites and as facilitators of students who must be guided in the use of critical thinking skills to evaluate the validity and reliability of the information they access on the Web.

Tillman (1998) discusses "Evaluating Quality on the Net" on the web page <www.tiac.net/users/hope/findqual.html>. This paper contains a list of generic criteria that instructors can use for evaluation:

- Stated criteria for inclusion of information
- Authority of author or creator
- Comparability with related sources
- Stability of information
- Appropriateness of format
- Software/hardware/multimedia requirements

When evaluating websites, it is important to review the track records and the quality and utility of the sites. For example, the ERIC database has a longstanding track record of providing access only to documents that have passed ERIC standards for database selection.

Tillman (1998) lists the following factors as important in evaluating website quality:

- Ease of finding out the scope and criteria for inclusion that lets me see whether there is a match with my needs.
- Ease of identifying the authority of the authors, the currency (of the material), the last update, and what was updated.
- Stability of information. Can I rely on its staying there?
- Ease of use in terms of both convenience or organization and speed of connection.

Baker (1997) suggests that educators serve as "Web Crossing Guards" helping student inquiry by providing a carefully selected list of criteria for resource selection on websites (p. 4):

- Usefulness of information
- Positive reviews of the site by site reviewers
- Reliability of sites listed at the site
- Ease of use
- Speed of access to viewing
- Documentation of sources
- Explanation of search services and other features
- Name and address of Web page sponsor listed
- Objectivity, expertise, and authority of Web page developer
- Intended audience
- Timeliness of the information provided
- Accuracy

Kerka (1997) offers additional insights into information management in the following publication.

Readings:

Kerka, S. *Information Management: Myths and Realities.* (1997)

Myths and REALITIES
by Sandra Kerka 1997
ERIC Clearinghouse on Adult, Career, and Vocational Education

Information Management

Information Overload. Info-glut. Infobog. Data Smog. As information proliferates so do the labels for this malaise of the "Information Age." In this half-century, for the first time in history, the capacity for producing information is far greater than the human capacity to process it (Shenk 1997). Self-directed adult learners need information management skills, and adult educators, who are dealing with overload themselves, can guide them in acquiring these skills. As people attempt to manage the tidal wave of information, a number of misconceptions have arisen. This publication explores some of these misconceptions, concluding with suggestions for better information management.

Too Much Information?

The "pervasive, invasive information infrastructure...is as much a part of our lives as religion was for medieval surfs" (Tetzeli 1994, p. 60). But is it too much? We've all seen the mind-numbing statistics about the exponential growth of information and of technological means of distributing and accessing it. However, some people question whether the problem really is one of overload. One source of the problem is actually the multiplicity of communication channels. Unlike earlier eras, such as when printing presses replaced manuscript copying, new technologies are not replacing older ones but are adding to the host of media choices (Davidson 1996). With these multiple channels the information flow is now simultaneous and multidirectional. However, most traditional information management practices are too linear and specific: they were pipes developed for a stream, not an ocean (Alesandrini 1992). The sheer quantity of information and the speed with which it can be acquired give an illusion of accomplishment (Uline 1996).

But what good is all this information if it is not usable? "Almost all our resources are dedicated to gathering the raw material—information—and almost nothing is spent on the most important job of transforming information into intelligence" (Milton 1989, p. 6). Milton suggests that it is possible to have "negative information"—that which causes the recipient to know less than before because it is not integrated, applied, and transformed into knowledge. Essential to information mastery is understanding the relationship between data, information, and knowledge (TAFE-TEQ 1992): data are raw facts and figures, information is data organized into a meaningful context, and knowledge is organized data (i.e., information) that has been understood and applied.

Perhaps it is not too much "information," but an explosion of "noninformation" (Wurman 1989) lacking relevance, quality, and usefulness. What is needed is better judgment of the quality, accuracy, and reliability of what is received (Kinnaman 1994). According to John Seeley Brown, people may perceive overload because the information they receive does not fit into current mental models for understanding the world (Tetzeli 1994). The problem of information overload thus has both technological and human aspects. The solution is also two pronged: both technological—create better technological tools and make better use of them—and human—revise mental models and sharpen the capacity for critical reflection and analysis.

I've Got to Keep Up!

Many people believe they have to try to stay on top of information because of economic, social, and employment-related pressures. The twin demons of speed and quantity create an artificial sense of urgency: with e-mail, voice mail, fax, and the Web, continuous streams of data are possible 24 hours per day at work, at home, and during the commute between.

The consensus of many books and articles (yes, an overload of information about information overload) is to forget about keeping up. "The Infobog becomes easier to handle once you accept it as a part of life" (Tetzeli 1994, p. 62). Davidson (1996) believes that most decisions are not of long-term importance, so it is acceptable to let go of lower-level choices and their related information needs. No one is immune from the impossibility of keeping up; rather than being paralyzed by the attempt, Davidson advises putting one's stake in the ground when instinct indicates that enough is known for a decision to be made.

For Wurman (1989), ignorance is the only state in which one can learn, but most people are reluctant to admit not knowing. One source of information anxiety is others' expectations of what we should know. In addition, society does not reward admissions of ignorance, so no one wants to be the first to press the "off" button. As Dvorak (1996) puts it, "just because you have a library card doesn't mean you're required to read every book in the Library of Congress" (p. 87). Lenox and Walker (1993) suggest that it is more important to know where and how to find what one needs to know. The focus should be less on the acquisition of information products than on the execution of information processes—thinking about and interacting with information.

It's All on the Web

One myth rapidly taking hold is that the World Wide Web is a one-stop source for all information needs and the secret to information management is in knowing how to navigate it. The capacity for speed, quantity, and ease of access make the Web a highly attractive information source, and there is also what Wurman (1989) calls "aesthetic seduction," the graphical display that makes information *look* good. However, "a piece of information performs when it successfully communicates an idea, not when it is delivered in a pleasing manner" (ibid., p. 125).

The Internet gives the impression that the pace of change has accelerated, but Dvorak (1996) attributes that to the fact that the Web has simply removed natural barriers between people and information they would otherwise never see. It may all have been *out there* before, but it was not easily accessible. What is often forgotten is that availability does not lend importance, accuracy, utility, or value to the content (Berghel 1997). Because everyone can (and seemingly does) publish on the Web, the responsibility for quality control is now on the receiver. However, "research has shown that many people feel that information gained through a computer screen is more reliable than that from any other source" (Breivik and Jones 1993, p. 29). Kinnaman (1994) tells of companies that published reports on computer printout paper because people were more accepting of their authority.

On the other hand, the attraction of the Internet for some people is independence from authority (McKenzie 1996). The lack of centralized quality control and the expansion of access may be good for democracy. However, as in any democratic institution the risks of demagoguery are present if people are not able to judge the quality and accuracy of sources (Kinnaman 1994). Sven Birkerts suggests that deep reading and thought are necessary to discover the truth in information (McKenzie 1996), but the Web encourages breadth over depth. As with any information source, critical information literacy is vital, and users must be wary of overreliance on any single information source.

Just Build a Better Mousetrap

One school of thought holds that better ways of structuring and retrieving information will help curb the information monster,

especially that multiheaded beast, the World Wide Web. Koniger and Janowitz (1995) assert that "information is valuable only to the extent that it is structured" (p. 6). The Web, they say, has dissolved familiar structures, so the medium is no longer a reliable indicator of the type of information it contains. Without preconceived notions of content, new kinds of information structures are needed. Rather than less information, Berghel (1997) and Koniger and Janowitz (1995) advocate information *about* information: cues provided by layout, typography, interaction method, color, etc. Researchers are developing "metadata" ("The Internet" 1997), electronic labels that describe aspects of Web content beyond the "page" metaphor, helping orient users to what can be found at a site. Other technological solutions available or under development (Berghel 1997) include (1) intelligent agents, software that automatically scans, filters, retrieves, and processes e-mails, voice mail, websites, and other sources to suit individual needs; (2) "push" technology such as PointCast and Marimba, which receives documents from various web sources, selects appropriate content according to user preference profiles, and downloads it to the desktop; and (3) "repel" technology, which may prevent unwanted information from finding its way to the desktop.

Although search engines and indexes provide some structured means of retrieving specific information, they are in many ways imperfect (Berghel 1997; "The Internet" 1997): being machines they overindex, excluding little; they categorize information differently than people do, providing uniform and equal access to everything; they do not always extract the right information because websites are not standardized; and they largely index text only. In addition, many providers are involved with transmission and storage, but too few are devoted to facilitating understanding (Wurman 1989). Wurman sees a need for translators and interpreters who focus on making information accessible and comprehensible. Berghel (1997) also wants information providers who grade, rank, review, annotate, and repackage information. As some acquire a reputation for quality and reliability, the choices information seekers must make are simplified.

However, others do not necessarily see salvation in better retrieval methods. The problem may not be retrieval, but the clash of information that is retrieved (Uline 1996). Sometimes generating, acquiring, and managing information become ends in themselves: we become "so enamored of our tools that we are enticed to use them simply because we *can*" (ibid., p. 31). It is possible to retrieve information (physical access) but be unable to understand it (intellectual access) (Wurman 1989). Time pressures and the comfort of familiarity may make people rely on information sources that are immediately available and accessible, but not necessarily the best (Savolainen 1995).

Again, it is as much a human as a technological issue. Kinnaman (1994) says that education emphasizes navigation of information sources over critical analysis, integration, and application. Lenox and Walker (1993) also criticize an antiquated educational paradigm that emphasizes acquisition, access, storage, and retrieval of discrete and fragmentary information (with computers and without). They urge development of the capacity for inquiry. The goal of information seeking should be finding the answers to personally meaningful questions. McKenzie (1996) considers questioning "the primary technology to make meaning(s). Questioning converts data into information and information into insight."

The Answer Is Knowing the Right Questions

Perhaps, as Shenk (1997) suggests, humans have not evolved fast enough to keep pace with information. We are still using the classic information retrieval model, which attempts to find the best match between mental "boxes" (questions) and structured information "boxes" that contain the answers (Hert 1994). Today, information management demands new metaphors. Hert (1994) suggests looking at the universe of information as (1) superhighway (learn how to drive, i.e., use the tools); (2) cyberspace (learn where to go, i.e., navigate); (3) city/community (critically question who put this information here? why? where are similar things found?); and (4) mine (discover available shafts, find and separate nuggets, refine them into ore, i.e., create knowledge). Hert's preferred metaphor is "ecosystem": in the information ecosystem, services and resources are constantly adapting to fill niches; foragers seeking "nutrients" strategically choose the ways in which they will browse and determine sources of high interest and value relative to the costs of obtaining them.

As lifelong learners themselves, adult educators can demonstrate for learners that the key to information management is self-management: knowing what *you* need to know. They can guide learners in finding their own personal pathway to information mastery. Shenk (1997) and Alesandrini (1992) offer some strategies for finding the way through the data smog onto that pathway: (1) be your own filter—turn off unneeded data streams; (2) be your own editor—ask whether the information you disseminate is absolutely necessary; and (3) use both a wide-angle and a zoom lens—"those who survive information overload will be those who search for information with broadband thinking but apply it with a single-minded focus" (Alesandrini 1992, p. 92). Shenk (1997) believes that concern about information have-nots is misplaced: everyone needs education more than information. "Education is the one thing we can't get overloaded with. The more of it the better" (p. 203).

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Enabling Authentic Assessment

"Inger (1995) points out that although vocational programs have traditionally measured student economic outcomes such as job placement, occupational competence, program completion and retention, and earnings, the Perkins Act of 1990 has shifted the focus toward accountability measures that are tied to student learning—basic and advanced academic skills, higher-order thinking skills, knowledge of the world of work, and so forth" (Brown 1997b, p. 1). Technology offers new ways to tie assessment to learning, to embed evaluation in the planning and conceptualization of training. Lohmann (1998) highlights the assessment process developed by the Tennessee Valley Authority (TVA) as an example of a successful endeavor.

The Tennessee Valley Authority University offers courses via interactive videoconferencing, live satellite broadcast, computer-based training, and classroom instruction. TVA developed their assessment and evaluation protocol prior to program development so that it could drive training. The assessment process it developed is "considered one of the best in the business. Data are used to manage the performance of instructors and vendors, validate the educational program design, inform curriculum decisions, and remove courses that aren't performing well" (ibid., p. 40). Data from reaction items and learners' self-reports are collected and mailed to the assessment and evaluation department where they are scanned and the results tabulated and sent to a database. "The data are sent to faculty and the faculty manager, who use it for coaching and feedback. The course manager assesses it for course design issues. The system automatically accumulates that information and analyzes it each month" (ibid., p. 41).

Western Governors University, a virtual university, teaches through video courses, tutorials delivered over the Internet, and other technologies. Its students are evaluated by a third-party organization rather than their instructor. Although such third-party evaluations are common in some professions, such as accounting, nursing, and law, Western Governors University plans to use standardized tests to measure "competency" in English, history, and other courses required for the associate of arts degree that the university plans as its initial offering. (Young 1997).

Instructors and trainers may tie assessments to learning over the Internet and World Wide Web by relating learning tasks and

evaluation to the real world of the student. Skill standards can be used to strengthen the connection between education and employment, providing at the onset of learning the criteria upon which performance will be assessed. Authentic assessments, which reflect a constructivist approach to teaching and learning, can also be used to acquire evidence of knowledge and skill development.

Allenspach et al. (1996) describe authentic assessments as those that "engage students in applying knowledge and skills in the same way they are used in the real world outside of school" (p. 8). Authentic assessments can be performance based, requiring demonstration in real-world settings. They can also be reflective of learning progress, including portfolios of work, peer reviews, and self-assessments facilitated by the use of rubrics. "Although they raise concerns about subjectivity, authentic assessments allow multiple human judgments of learning" (Kerka 1995, p. 1). They allow students to present evidence of knowledge and skill development in ways that are meaningful to them and unique to their learning preferences. For example, a student encouraged to present evidence of knowledge and skill development in keeping with his/her learning style preferences may elect to prepare an audiovisual presentation as evidence of learning rather than a written report.

Internet technologies have expanded instructor options for student assessment. For example, teacher feedback—a vital part of ongoing assessment for self-improvement—can be provided more immediately through use of technologies, making learning and assessment an interactive, ongoing process actively involving both students and teachers. Because learning is a cumulative process, check points should be established in the distance education or web-based training program where learners as well as instructors can monitor learning and obtain/provide feedback to guide further teaching and learning efforts. Through the interactive capabilities of new technologies, this input can be provided by instructors, peers, parents, and community members, with progress self-monitored by the learner.

The following publication offers information about portfolio assessment as a tool for evaluating student learning. Since evidence of learning—examples of instructor feedback, peer reviews, accomplishments, and samples of work—can be contained in a computer file, the ease of inserting and accessing portfolio contents makes the portfolio an effective practice for enriching assessment.

Reading:

Brown, B. A. *Portfolio Assessment: Missing Link in Student Evaluation. Trends and Issues Alert.* (1997)

TRENDS AND ISSUES ALERTS
by Bettina Lankard Brown 1997
ERIC Clearinghouse on Adult, Career, and Vocational Education

Portfolio Assessment: Missing Link in Student Evaluation

Portfolio assessment is an alternative form of assessment that is particularly attractive to adult, career, and vocational educators because it includes the assessment of active learning and performance rather than the mere recall of memorized facts. It serves the interests of business and industry as well by forging a connection between activities in the classroom and the world beyond school. The successful achievement of these anticipated outcomes, however, depends upon the purposes, practices, and structures that guide implementation of this new form of assessment. This Alert reviews the current trends in portfolio assessment and examines the issues that guide its use as a tool for evaluating student learning.

Portfolios were introduced initially as a way for artists, graphic designers, and other such professionals to show evidence of their work, illustrating their skill at applying knowledge to practice. With education's increasing focus on performance standards and student-centered classrooms, the portfolio has become more than a repository of work samples. As an assessment tool, the portfolio must reflect both the "breadth of study envisaged by the curriculum and the quality of work that students are expected to produce" (Borthwick 1995, p. 25).

Portfolio assessment extends the basis of assessment beyond the "conventional" or multiple-choice category to the "alternative" assessment of active learning based on clearly defined standards (Willis 1996). The appeal of portfolio assessment is its response to integrated curriculum. For example, the portfolio contents may include examples, reviews, and other demonstrations of students' vocational skills as well as academic achievements evidenced through multiple types of assessment, e.g. performance, process, and product assessments. It offers teachers "vital information for diagnosing students' strengths and weaknesses to help them improve their performance" (Borthwick 1995, p. 24). When portfolio criteria are linked to the curriculum and give students clear expectations of what is required, they are an effective tool for helping students "see gaps in their learning, determine strategies that support their learning, celebrate risk taking and inquiry, set goals for future experiences, and see change and development over time" (Porter and Cleland 1995, p. 23).

Portfolios offer the additional benefit of involving students in the assessment process. Portfolio assessment is not teacher driven as is common in conventional assessments. In keeping with the trend toward student-centered classrooms, portfolio assessment is a shared responsibility. It requires the involvement of students, parents, and employers, as well as teachers, in establishing the assessment standards, criteria, and content of the portfolio. It affords students the opportunity to manage and monitor their learning, document their progress and achievements over time, articulate their achievement levels, and, more important, experience success.

Portfolio assessment offers teachers a way of motivating students, which is being recognized as a critical function of assessment. "A good assessment model support students' desire to learn, rather than imposing a set of demands and expectations on them, which will blight their intrinsic motivation" (Willis 1996). Portfolio assessment motivates learning when it engages students in active learning and gives students some control over what and how they learn and how their performance will be assessed. A recognized value of portfolio assessment is that it can accommodate the diverse learning patterns of all students and enable each of them to realize and experience success (Caine and Caine 1990).

Some of the main issues regarding the difficulty of using of portfolio assessment are related to reliability (Stecher et al. 1996). Problems in *scoring* emerge when the portfolios contain different pieces and have diverse purposes. Lack of *standardization* in the way portfolio entries are produced and the amount of assistance students received present another assessment problem. *Competency interpretation* poses another problem of portfolio assessment in that "portfolios constructed of 'best pieces' may not reflect sustainable levels of performance under normal conditions" (Stecher et al. 1996, p. 60). Also of significance is that teachers may not be equipped to conduct effective portfolio assessments without staff development training and time to collaborate with other instructors to develop portfolio rating criteria.

The technical and practical issues of performance assessment are a continual challenge to educators. The annotated bibliography that follows provides sources for additional information about portfolio assessment and its use in adult, career, and vocational education.

Print Resources

Allenspach, D.; Laurenson, S.; White, R.; and Loyd, C. M. *Alternative Assessment: A Family and Consumer Sciences Teacher's Tool Kit.* Columbus: Vocational Instructional Materials Laboratory, The Ohio State University, 1996. (ED 402 434)
Shares current thinking, research, and practices regarding the use of alternative forms of assessment in family and consumer sciences occupational programs. Contains an overview of alternative assessment approaches and materials for beginning and conducting the various forms of alternative assessment.

Birrell, J., and Ross, S. "Standardized Testing and Portfolio Assessment: Rethinking the Debate." *Reading Research and Instruction* 35, no. 4 (Summer 1996): 285-298.
Argues that standardized testing and portfolio assessment are not oppositional methods for determining student growth and teacher effectiveness but are complementary means of gathering and interpreting information that can lead to more holistic evaluations of student achievement in school.

Borthwick, A. "Body of Evidence." *Vocational Education Journal* 70, no. 3 (March 1995): 24-26. (EJ 398 567)
Supports the use of portfolios as an authentic means of evaluation that helps students to assess their own strengths and weaknesses so that they can present themselves positively to a potential employer.

Bragg, D. "Assessing Postsecondary Vocational-Technical Outcomes: What Are the Alternatives?" *Journal of Vocational Education Research* 20, no. 4 (1995): 15-39.
Describes the practice of the most innovative 2-year colleges and community colleges in using nontraditional methods such as portfolio assessment to assess a wide variety of outcomes, including some not usually associated with vocational-technical education.

Bujan, J. et al. "Increasing Students' Responsibility for Their Own Learning. A Teaching and Leadership Action Research Project Report," St. Xavier University, May 1996. (ED 400 072)
Describes an action research project, the goal of which was to improve students' taking responsibility for their own learning and presents the following interventions: use of graphic organizers, problem-solving strategies, higher-order thinking skills, and portfolios.

Caine, R., and Caine, G. "Understanding a Brain-Based Approach to Learning and Teaching." *Educational Leadership* 48, no. 2 (October 1990): 66-70. (EJ 416 439)
Offers 12 principles as a general foundation for brain-based learning, including the brain is a parallel processor; learning engages the entire physiology; the search for meaning is innate and occurs through patterning; emotions are critical to patterning; and every brain simultaneously perceives and creates parts and wholes.

Duffy, L. *School-to-Work Career Portfolios, Instructional Guide. Family and Consumer Science*, 1996. (ED 401 447)
Describes the preparation of a school-to-work career portfolio by eighth-grade family and consumer science course teachers. Contains detailed instructions for designing a school-to-work career portfolio.

Far West Lab for Educational Research and Development. *Career Preparation Assessment. Portfolio Guidelines.* San Francisco, CA: Far West Lab, 1995. (ED 392 919)
Contains the materials and guidelines required to complete a Career Preparation Assessment (CPA) portfolio, which is a classroom-tested, employer-validated, performance-based assessment of career readiness skills for use by high school students.

Felstehausen, G. et al. *Authentic Assessment for Occupational Competency for Career and Technology Education. Final Report. Year Three.* Lubbock: Texas Tech University, 1996. (ED 396 110)
Reports on the field testing of the portfolio model in selected career and technology education programs and describes the portfolio evaluation contents: scoring sheets and rubrics for portfolio documents; rating or score sheets; letter grades and self-evaluation; and a holistic approach to evaluate the entire portfolio.

Gillespie, C. et al. "Portfolio Assessment: Some Questions, Some Answers, Some Recommendations." *Journal of Adolescent and Adult Literacy* 39, no. 6 (March 1996): 480-491.
Discusses answers to teachers' questions about portfolio assessment, e.g., advantages and weaknesses, type of data to be included, criteria for assessment, ways to determine validity and reliability, uses of portfolio assessment, and future outlook.

Lankard, B. *Acquiring Self-Knowledge for Career Development. ERIC Digest No. 175.* Columbus, OH: ERIC Clearinghouse on Adult, Career, and Vocational Education, 1996. (ED 399 414)
Mentions portfolio assessment as one of the processes by which students can gain experiences that enhance their self-knowledge. Points out that there are various types of assessments that contribute to self-awareness, e.g., assessments using performance tests and documentation of performance through career passports and portfolios. Emphasizes the importance of student reflection upon what they are learning.

McLaughlin, M., and Vogt, M. *Portfolios in Teacher Education.* Newark, DE: International Reading Association, 1996. (ED 403 572)
Describes teacher education courses where undergraduate and graduate students learn about portfolios and experience their use firsthand and are evaluated using portfolio assessment techniques—the same methods they will use in their own classrooms. Also explores how portfolio assessment can enable university educators to move from traditional methods of testing to more authentic assessment that reflects each student's real progress.

Newmann, F.; Marks, H.; and Gamoran, P. "Authentic Pedagogy: Standards that Boost Student Performance." *Issues in Restructuring Schools. Issues Report No. 8.* Madison, WI: Center on Organization and Restructuring of Schools, 1995. (ED 404 346)
Describes the development of portfolio management strategies to assess the oral language and literacy skills of sixth- and seventh-grade students in English as a second language urban middle school classrooms.

Newman, C. et al. "Student-Maintained Portfolios and Peer Mentoring as a Means of Empowering and Motivating Students: Unexpected Outcomes." Paper presented at the annual meeting of the Eastern Educational Research Association, Boston, MA, February 1996. (ED 404 346)
Reports on the development of oral language and literacy skills and the development of portfolio management strategies to assess these skills in sixth- and seventh-grade students. Describes evaluation results which indicate that the portfolio management system has been largely successful in helping students become involved in assessing their progress.

Porter, C., and Cleland, J. *The Portfolio as a Learning Strategy.* Portsmouth, NH: Boynton/Cook Publishers, 1995. (ED 375 433)
Looks in depth at the curricular and instructional framework of a student-centered classroom. Describes learning strategies in detail and illustrates with student samples that portfolios can assist students in reflective self-evaluation.

Reckase, M. "The Design and Field Test of the ACT Portfolio System." Paper presented at the annual meeting of the National Council on Measurement in Education, New York, April 1996. (ED 400 313).
Describes the field testing of a portfolio assessment model designed for use on a national level to determine if its implementation will result in scores that are of sufficient reliability and validity that they can be used for decisions at the student level. Includes a description of the efforts.

Redman, W. *Portfolios for Development: A Guide for Trainers and Managers.* East Brunswick, NJ: Nichols Publishing, 1994. (ED 394 059)
Describes the use of portfolios as a way demonstrate competence and show development needs among employees in organizations. Explains how the portfolio is linked with the current training revolution taking place through the introduction of National Vocational Qualifications in Great Britain. Shows how portfolios can be used within an organization's own training and development program.

Stecher, B. et al. *Using Alternative Assessments in Vocational Education.* Santa Monica, CA: Rand Corporation, 1996. (ED 400 465).
Describes alternative assessments in vocational education, reviews examples from extended case studies, and discusses criteria to use to choose among assessment alternatives. Contents describe the assessment alternatives and the primary purpose served by each type, the conditions that are creating pressure for alternative methods of assessment among vocational education, the range of assessment methods, the quality and feasibility of alternative assessments, the factors influencing assessment choice and examples of the kinds of assessment decisions confronting vocational educators.

Willis, S. "On the Cutting Edge of Assessment: Testing What Students Can Do with Knowledge." *Educational Update* 38, no. 4 (June 1996): 4-7.
Challenges educators to consider student motivation to learn as the goal for schooling and to focus student assessment on practices that will provide students with information to fuel their interest in further learning.

Wolfe, E. "A Report on the Reliability of Large-Scale Portfolio Assessment for Language Arts, Mathematics, and Science." Paper presented at the annual meeting of the National Council on Measurement in Education, New York, April 1996. (ED 399 285)
Presents the results of studies on inter-rater reliability with large-scale portfolio assessments. Notes that the scores for language arts, mathematics, and science classes are mixed and emphasizes that, although portfolio assessment is becoming increasingly popular, it may not survive unless portfolio scoring can meet the demands of large-scale assessment standards.

Developed with funding from the Office of Educational Research and Improvement, U.S. Department of Education, under Contract No. RR93002001. Opinions expressed do not necessarily reflect the position or policies of OERI or the Department. *Trends and Issues Alerts* may be freely reproduced.

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Technology as an Impetus for Reform

As technology accelerates information access and acquisition, and as growing numbers of people use communication technology to conduct their everyday business activities, familiarity with and acceptance of distance learning, Internet usage, and the World Wide Web can only increase. Businesses (and business-conscious people) are recognizing the market potential for web-related endeavors—e.g., note the increasing price per share of Internet stocks, the increased number of websites devoted to product sales—and this includes those associated with education and training. To Wall Street and aspiring entrepreneurs, the market for postsecondary education and training looks "ripe for the picking" (Marchese 1998).

"Alternative and distance providers claim just 2% of the postsecondary market today, but a combination of pent-up demand, changes in the tax law, and today's E-commerce boom could quickly balloon that market share by a factor of 10 . . . at which point larger transformations could kick in" (ibid.). Marchese (1998) reviews the aggressive endeavors and enrollment achievements of these nontraditional education providers:

In just a few years, the *University of Phoenix* has amassed an enrollment of "48,000 degree-credit students at 57 learning centers in 12 states" (ibid.). Its focus is on bachelor's degree completion and master's degree students, 97% of which started their education elsewhere and 57% of which are women, 37% minorities (ibid.).

Chicago's *DeVry Institute of Technology* enrolls 48,000 students in business and technical programs on 15 campuses in the United States and Canada. Indianapolis' *IIT Educational Services* enrolls 25,000 students in its 62 institutions. Both of these proprietary institutions serve undergraduate students (ibid.).

Similar to these "for-profit" institutions are not-for-profit colleges and universities offering courses at a distance such as *Webster University* in St. Louis, which "boasts 15,000 students in 64 U.S. locations and 6 overseas sites," and the *University of Maryland's University College*, which claims "35,000 students at hundreds of sites" (ibid.).

Most ambitious in competition for the postsecondary market is the *Western Governors University*, which has 17 governors among its founders and 14 business partners that include IBM, Sun, AT&T, KPMG, Cisco, 3COM, Microsoft, and International Thomson. Its goal for enrollment by the early 21st century is 95,000 students and all degrees will be competency based. "As courses are added from national universities, corporations, and publishers, Utah governor Mike Leavit foresees WGU becoming the 'New York Stock Exchange of technology-delivered courses'" (ibid.).

Another closely watched start-up is the Michigan Virtual Automotive College, which hopes to become the hub for auto industry education and training. 'In its first 16 months of operation, MVAC has put together some 115 courses with professors or units from 27 universities (including Phoenix); 300 students are now enrolled, 2,000 set for fall. When suppliers, dealers, repair shops, and retail outlets are taken as part of the auto industry, enrollment projections soar to six and seven figures" (ibid.).

Competition from such new providers is bound to have an impact on distance education and web-based training. The question is whether the influx of private sector money to support development of multimedia, interactive learning programs will enhance vocational and technical institutions' use of technology in education or displace these institutions as providers of distance education and training. As noted in this publication, technology is merely an educational tool, facilitator, and strategy. Its role is to enhance new models of teaching and learning based on constructivist pedagogy, cognitive theory, principles of collaborative learning, critical analysis, and authentic assessment. Students learn through activities that build upon their prior knowledge, engage them the social construction of knowledge through interactions and negotiations with others, and involve them in reflection about what they have learned so that they can apply that learning in their continual pursuit of lifelong learning. Traditional educational institutions will have a better chance of retaining and expanding their student base by placing students and their learning needs at the forefront of educational policy and practice. Technology can enable knowledge acquisition, but only educators and trainers can inspire and promote knowledge and skill development, using technology to support their efforts.

According to Imel (1999), "the skills needed to succeed in the workplace have changed significantly" (p. 1). Technical skills remain important, but increasingly employers recognize the importance of "core," "soft," or "essential" skills such as knowing how to

learn; effective listening and oral communication; reading, writing, and computation; personal management; interpersonal skills; and creative thinking and problem solving. This substantiates the need for a integrated approach to teaching and learning and serves as a reminder of why technology must be used to facilitate learning and empower learners, not replace instruction.

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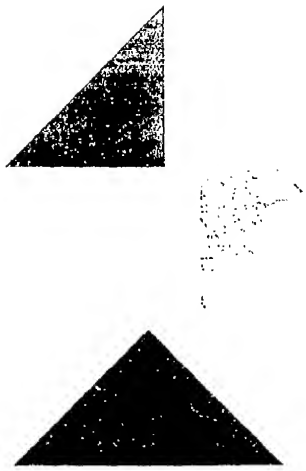

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